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Improved Shutter.

Until this day, shutters for shops and store fronts have been so badly arranged that many people have ceased to use them altogether, leaving their stores entirely unprotected at night, rather than put up and take down, some three hundred times a year, a pile of lumber in the form of panels. These shutters are also in the way of traffic, and are knocked to pieces or defaced in a short time. Flexible shutters raised with gearing, others swung on hinges like barn doors, and many other contrivances, have been tried, but have failed to come into general use.

The following engravings represent a flexible shutter on a novel plan, combining beauty with facility of closing an entire front in the shortest possible time. It may be applied to all stores—one-third, one-half, or at the full hight of windows and openings of fronts. It is also intended to be used instead of doors to warehouses, in which it will work some important changes, as this shutter will close openings even wider than twenty feet without the slightest inconvenience—such wide openings being certainly more desirable than the narrow door-ways of the present style of warehouse fronts, which are very inconvenient for handling heavy packages.

Fig. 1 represents a store front to be closed with two shutters meeting in the center of the lobby, thus closing it without any night door. The shutter, as seen in this illustration and in Fig. 2, is made of vertical staves, A, matching each other with bead and core, and flexibly joined with hinges, B, laid inside the staves. These staves are generally made of wood, and may be plated with galvanized iron. The bearing rollers, C, support and carry it, while friction rollers, D, guide it in its desired course, which may be straight, curved, serpentine, or circumvoluted; the guiding rollers are also fitted to the top of the shutter. Fig. 3 shows a horizontal section of a shutter and track run behind a cast-iron pilaster, or support of front on party wall; such arrangement being suitable for the illustration in Fig. 1—A being the staves, B the guiding rollers, and C the track.

Fig. 4 shows a section of a U-shaped iron track—the sides being the guides of friction rollers, D, and the bottom the flat-foot track for the bearing rollers C. In passages, close to the floor, this track will be movable and raised, swung on a hinge, to be housed against the piers or columns, when the shutter is slid back, in day time, or it may also stand on what is called gib doors.

As will be understood from these engravings, the shutter is moved like a sliding door, and the object of making it flexible is to enable it to be housed and stored out of the way, in the day time, against party walls, behind shelves, inside cast-iron or wood shafts of columns, or in piers supporting the fronts of houses. While in motion, as it bends only in two or three links at a time, and being well provided with guiding friction rollers, it runs very nearly as easy as any well-contrived sliding door, there being but little strain on any of its parts.

Fig. 1

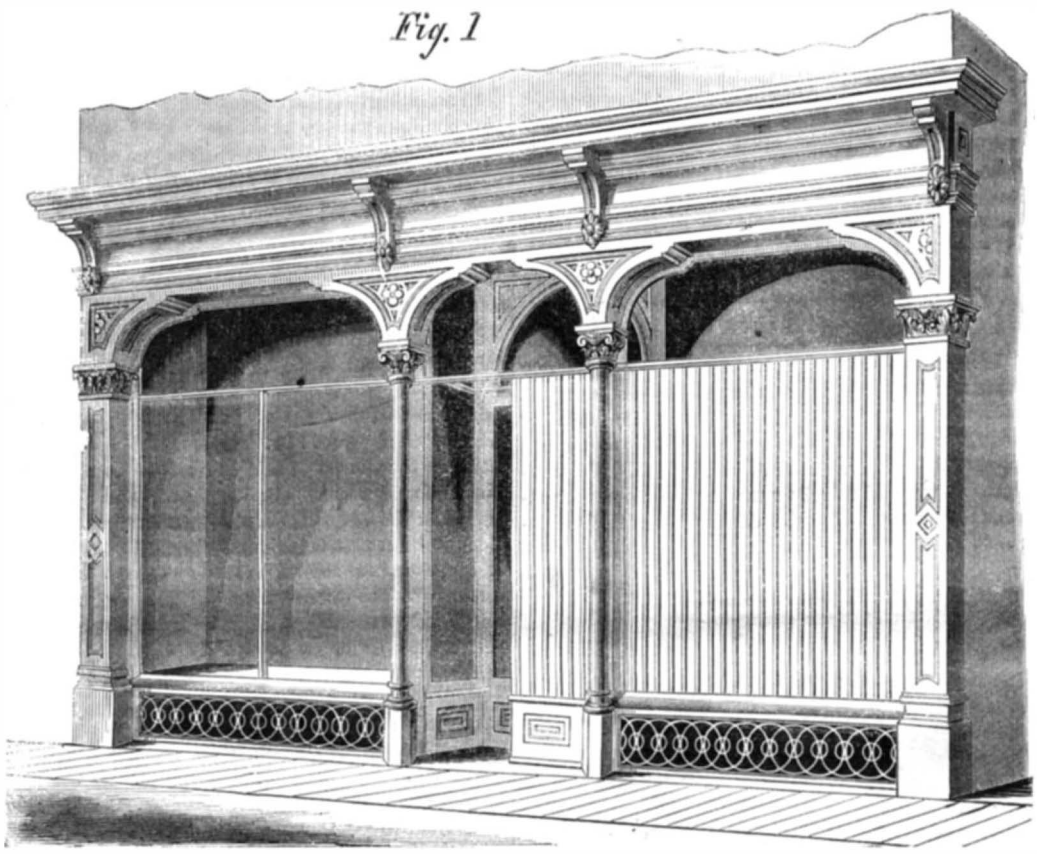


Fig. 3

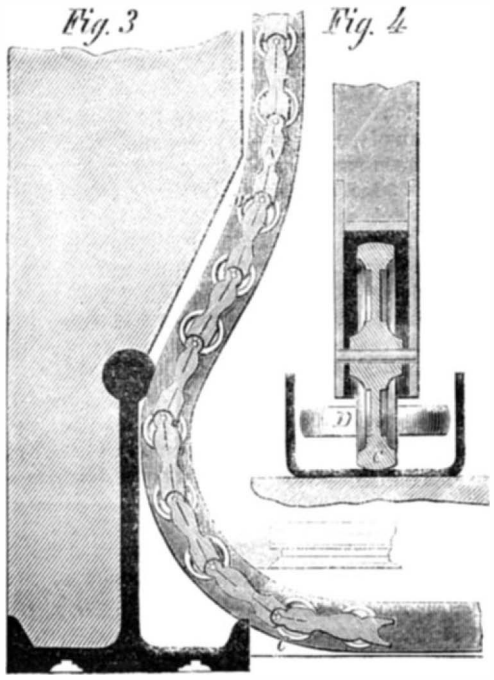
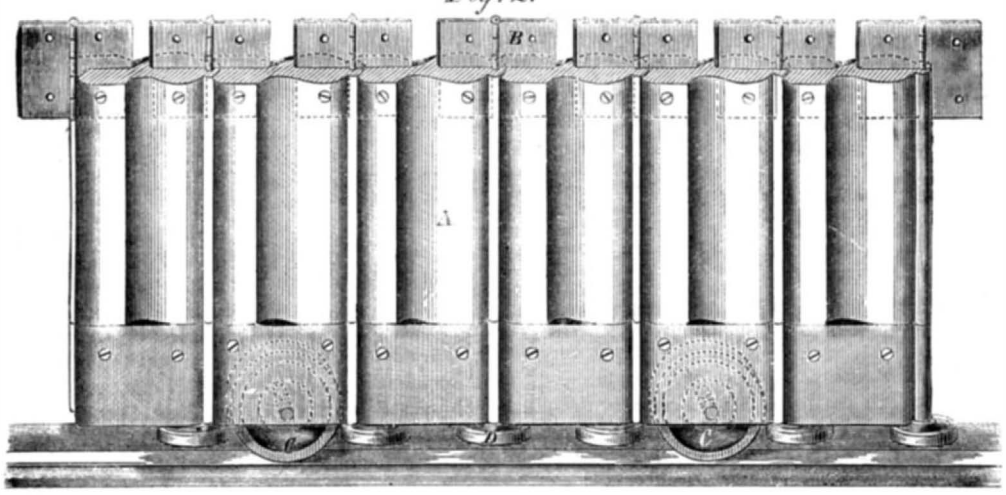


Fig. 4

Fig. 2.



This shutter was patented on Dec. 6, 1864. For further information address Jesse A. Vrydagh, architect, Cincinnati, Ohio.

VRYDAGH'S PATENT SHUTTERS.

Rifled Artillery.

The report of the Ordnance Select Committee, which conducted the trial in England of the competitive guns rifled on three different systems, contains the exact results of the experimental practice with each gun. Those results are noted so minutely in the tables appended to the text of the report, that every shot fired can be referred to. As the trial has ranged over three years, it may be supposed that the tables and diagrams make up the greater portion of the volume.

The experiments to which the first part of the report refers were made with 7-inch wrought iron guns, rifled on the French system, and the competing systems of Commander Scott, R. N., Mr. Lancaster,

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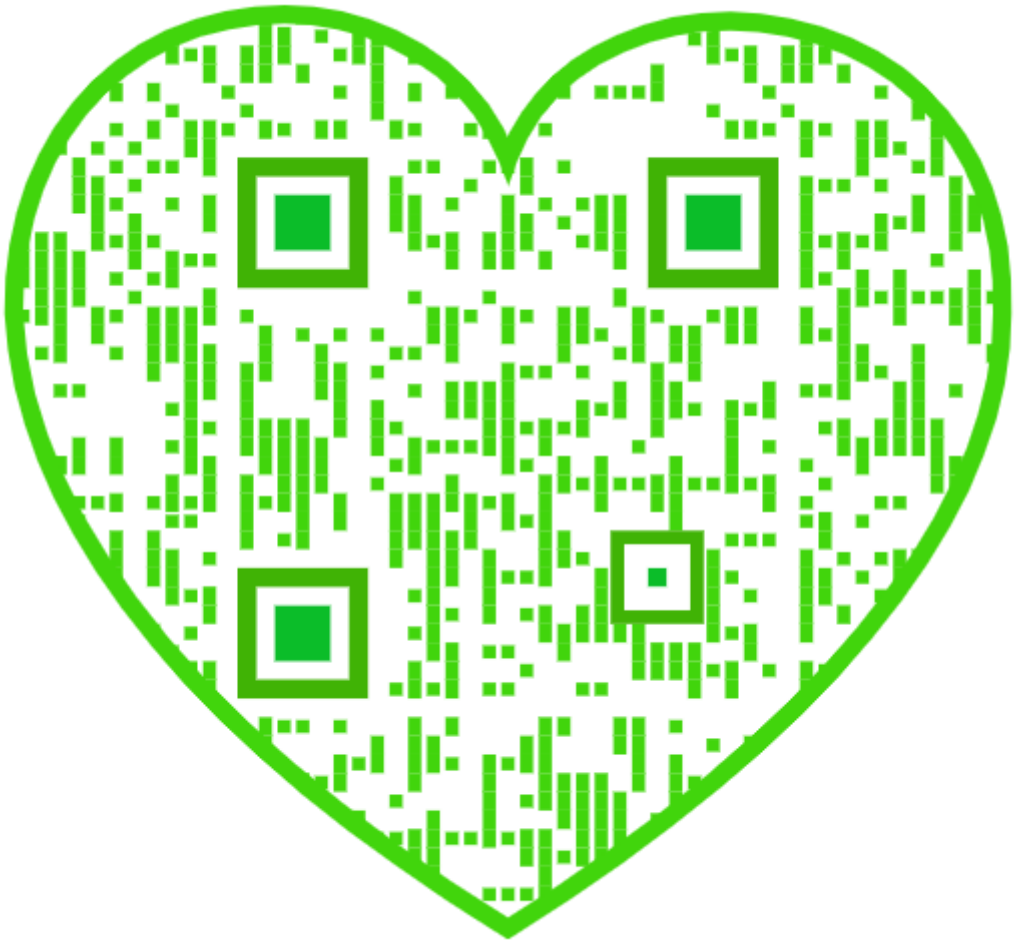

Mr. Jeffery and Mr. Britten. On these weapons the Committee make the following remarks:—

"The difference between the systems of Messrs. Jeffery and Britten consisted substantially in the method of attaching lead to the base of projectiles, and one gun only was prepared for these two gentlemen. The French gun was added at the request of the Committee. The Committee, warned by the experience of the former competition, determined on this occasion to limit the trial strictly to the rifling of the guns, and they therefore endeavored to eliminate all other sources of difference, and themselves fixed a uniform weight and form and windage of shot, and also the charges of powder. Mr. Lancaster's shot are slightly shorter than the others, because the Committee had previously determined that the term '7-inch,' gun should mean a gun down which a 7-inch spherical shot could be rolled, and under that definition the internal sectional area of an oval bored gun must necessarily be larger than that of a grooved gun of the same nominal caliber. The Committee would gladly have confined the competition to the same amount of twist, but it was clear that the expanding projectiles of Messrs. Jeffery and Britten would be unfairly treated if fired from a gun with as sharp a spiral as would suit the other competitors; and, moreover, the French system is that of an increasing twist, while that of the others is uniform. They therefore allowed each competitor full latitude in this respect."

The following paragraph gives a more detailed description of the guns:—

"The guns are muzzle-loading. They have solid steel tubes 3 inches thick, a solid forged breech piece, and external strengthening coils. Their weight averages 149 cwt., and the length of bore is 10 feet 6 inches. Cammell's steel is used in Scott's, Lancaster's, and the Jeffery and Britten guns, and Firth's steel in the other. They are vented 5·75 inches from the end of the bore, being the position to give the greatest initial velocity with a charge of 20 lbs."

The shot used were solid, weighing 100 lbs and 110 lbs. The powder used was A4, and the cartridges were made up to a uniform diameter of 6 inches and five-tenths. The charges varied in weight from 12 lbs. to 25 lbs.

The following are stated as the "general results" of the trial:—

"*Lead-coated Expanding Projectiles.*—A very short experience showed that the systems of Messrs. Jeffery and Britten were unsuited for heavy charges; large pieces of lead were blown off the shot, and the shooting was so wild as to throw these systems entirely out of the competition.

"*Endurance.*—About 350 rounds have been fired from each gun. This is insufficient to test the endurance of guns such as these, but it is sufficient to indicate that with steel-lined guns there need be no fear of the breaking down of the grooving by the abrasion of the ribs or studs in either of these systems; at all events when in Commander Scott's system soft bearings are used. The Committee can see no reason at present for placing one gun before the other in point of endurance.

"*Easiness of Loading.*—The French gun was certainly the easiest to load; but there is nothing to complain of in this respect in Commander Scott's gun. Mr. Lancaster's shot were all got home with more or less difficulty, and in some cases a metal rammer had to be used.

"*Liability of the Projectiles to Injury from Rough Usage.*—None of these descriptions of shot are liable to injury from knocking about, but the Lancaster should take the first place in this respect; Commander Scott's first plan the second place; the French shot on Palliser's system the third, and Commander Scott's second plan the last.

"*Recoil.*—There seems no practical difference between the guns in this respect. In the early part of the trial the Scott gun had the greatest recoil, but on an exchange of carriages with the French gun, their places in this respect were reversed."

There is no difference worth mentioning in the cost of rifling on these three systems. The report thus concludes.—

"Commander Scott's gun has the advantage of both the others in point of range with round shot, but is very much inferior to both in uniformity of range and accuracy. It is worthy of remark that the charge of 20 lbs., which is nearly half the shot's weight, gives an increase of velocity of only 271 feet, and only 200 yards, or thereabouts, of additional range, over the charge of 12 lbs., which latter charge, with a small windage allowed, gives a considerably higher velocity than that of a service 32-pounder or 68-pound shot. The committee have now placed the Secretary of State in possession of all the data that are requisite for comparing these five systems of rifling as applicable to heavy battering guns using a charge of one-fifth or one-fourth the weight of the shot. The gun rifled on the French system, with arrangement of the studs suggested by Major Palliser, gives by far the best result—so far, in point of accuracy, the trial not having proceeded beyond solid shot of the forms and weights specified. It was the easiest to load, and although somewhat inferior to Commander Scott's gun in respect to firing round shot, is in every other respect equal or superior to it. The committee also prefer it to Lancaster's, although Mr. Lancaster has subsequently shown how, in his opinion, his shot may be made very easy to load without increase of mean windage, by taking the windage allowed chiefly off the third quadrant of the shot. The committee are confirmed in the preference expressed above by the superiority which the French system of rifling evinced over the former plans of the same gentleman when tried in rifling cast-iron 32-pounder guns in 1862. For reasons already given, they reject both the systems of lead-coated projectiles as unsuitable for heavy charges."

ATTRACTION.

In looking over the early volumes of the SCIENTIFIC AMERICAN, a few days ago, the memories of the past were vividly brought to mind by reading the following poetry, which appeared in the first column of the first issue of this paper, dated Aug. 28, 1845. We wondered as we read this how many of our present patrons remember reading the effusion when it first appeared:—

Attraction is a curious power,
That none can understand:
Its influence is everywhere—
In water, air and land;
It keeps the earth compact and tight,
As though strong bolts were through it;
And, what is more mysterious yet,
It binds us mortals to it.

You throw a stone up in the air,
And down it comes—ker-whack!
The centrifugal casts it up—
The centripetal—back.
My eyes! I can't discover how
One object 'tracts another;
Unless they love each other, like
A sister and a brother.

I know the compass always points
Directly to the pole:
Some say the North Star causes this,
And some say—*Symmes's Hole!*
Perhaps it does—perhaps it don't;
Perhaps some other cause;
Keep on *perhapsing*—who can solve
Attraction's hidden laws?

A fly lights on a 'lasses cup—
Attraction bids him woo it;
And when he's in, attraction keeps
The chap from paddling through it.
Attraction lures the sot to drink,
To all his troubles drown;
But when his legs give way, he falls,
And 'traction keeps him down.

Attraction is a curious power,
That none can understand:
Its influence is everywhere—
In water, air and land.
It operates on every thing—
The sea, the tides, the weather;
And sometimes draws the sexes up,
And binds them fast together.

British Association.

Among the papers read were the following:—

THE POLES IN MAGNETS.—Captain Selwyn read a paper on "Some new arrangements of the Poles in Magnets," in which he said one phenomenon connected with magnets was, there might be, and often was, a succession of north and south poles in a bar magnet. He described an experiment he had made with regard to the subject. A steel bar having been prepared, and hardened as usual, it was magnetized by any ordinary means—either by touch or an electric current. Then either at the center or at any other point of the bar, where it was desired that the two poles should eventually be in juxtaposition, and even in more than one place, the temper was taken out of the bar by a rod of heated metal, or by a blow-pipe, this operation separating the two magnets, though the needles were still respectively north and south.

COMPOUNDS OF COPPER AND PHOSPHORUS.—Mr. F. A. Abel read a paper on the compounds of copper and phosphorus. This paper was devoted to the description of a series of experiments made to ascertain if phosphorized copper would be more effectual as a material for the manufacture of cannon than the alloy in general use. After referring to the different chemical compounds of copper and phosphorus known, Mr. Abel spoke of his experiments on phosphorized copper, with respect to its tensile strength. He found that an ingot of copper one inch in area broke under a strain of about 25,000 lbs., that of a similar ingot of gun metal required 32,000 lbs. While copper combined with ·5 per cent of phosphorus required 38,389 lbs., and with 1·4 per cent phosphorus the strain that the ingot would bear was upward of 47,000 lbs. Although these experiments showed the very superior tenacity of the phosphorized copper, yet there were practical difficulties which prevented the application of this compound to gunnery. In the course of the discussion which followed the reading of this paper, Mr. Abel stated that this phosphorized copper would not be at all suitable for telegraphic purposes, as the presence of phosphorus was most detrimental to the metal as a conductor of electricity.

SILICIUM IN IRON.—Dr. Phipson's paper on this subject was read by the Secretary of the Section, Mr. Winkler Wills. It was well known that silicium existed in cast iron, not only in the free, but also in the combined state. Dr. Phipson had been led to examine the subject of silicium in iron from the fact that he found several samples of iron, which were reported as yielding very different qualities of Bessemer steel, to be of precisely similar chemical composition, and following up the subject, he came to the conclusion that the difference in the quality of the steel arose, not from differences in the total quantity of silicium, but from the manner in which it occurred, as free or combined. This matter was of great importance, as the author was now enabled to determine, by ascertaining the amount of combined silicium, as to the suitableness of an iron for the manufacture of Bessemer steel, that iron which yielded the smallest quality of combined silicium being most suitable for this purpose. Mr. Abel said that had Dr. Phipson been present, he would have been glad to have heard in what manner that gentleman distinguished between combined and uncombined silicium.

Captain Nole stated that no iron was so deficient in tensile strength as hematite iron, but he had determined that this weakness was not due to the silicium the metal contained.

In reply to a question by Mr. De la Rue, Mr. Bell stated that borax—an element very closely allied to silicium—had not been found in any analysis of iron, and that the character of an iron would vary very much, although precisely similar materials were used in its production.

Dr. Miller suggested the spectroscope should be used, in order to determine the presence of barium, the lines given by this element being very characteristic.

Hall's Journal of Health says:—"If any one wishes to spend three dollars a year for a weekly paper, always edited with ability, and which has no peer in the world, of its class, and which can never be read without profit, by scientific minds, or by the members of the household in city or country, let him order for one year the SCIENTIFIC AMERICAN, No. 37 Park Row, New York. Then comes that always welcome weekly, with a name so suggestive of abundance and refinement."

In return for the above we can emphatically say that *Hall's Journal of Health* is the best popular publication of the kind extant, and ought to be read in every family in the land. The October number now before us contains very instructive articles upon Cancer, Stammering, Children's Feet, Gruel and Soups, The Sick School Girl, Corn Bread, Deranged, Correcting Children, Convenient Knowledge, Charms,

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Curiosities of Eating, Mind and Body, Bread, Memories, Eating Economically, etc. Every article is worth the price of the number in which it is printed. We have often thought that if Dr. Hall practices as well as he preaches, he must be very near to a *perfectionist*. Terms, $1 50 per annum. Editor, W. W. Hall, M. D., No. 2 West Forty-third street, New York.

WELDLESS TIRES AND CIRCULAR ROLLING.

On the 11th of September Mr. F. J. Bramwell read before the British Association a paper on this subject, from which we take the following extracts, clearly describing the process in practical operation on a large scale at the works of Mr. Owen, at Rotherham, England.

Bars of flat or square iron, of a suitable section and quality, are bent round a block into a helical hoop, so as to make a pile of a diameter and width suitable for the intended tire. Experience has shown it is desirable that the hoop should, before it is welded, be about two and a half to three times the hight that it should have after the welding has taken place, this latter hight being that of the width of the completed tire. That is to say, that if the completed tire is to be 5 inches wide, the unwelded hoop would be made about 12½ inches to 15 inches high. Experience also has shown that the diameter, when welded, should be not more than one-half the dimension of the finished tire, so that if the finished tire hoop is to be 3 feet diameter, the unwelded coil would be about 1 foot 6 inches or 1 foot 8 inches diameter.

The coil being made is placed in a furnace, where it is heated to a full welding heat. It is then removed from the furnace by the aid of a pair of tongs mounted on a pivot, supported on a carriage running on a railway, and is carried to the annular die tool prepared for it, which is supported on the massive anvil of a steam hammer. Attached to the piston-rod of this hammer is a top tool. On the hammer being put to work the coil is beaten down to about two-fifths or one-third of its original depth, and is, of course, proportionately widened so as to be made to fill the space left in the interior of the bottom die, and in this manner a uniform and weldless tire ring or tire blank is produced. Great solidity and freedom from impurities are obtained in these rings; this is no doubt principally due to the very large hammering power employed. The cylinder of the hammer is as much as 27¾ inches diameter of bore, and the weight of the moving parts is from 8 to 12 tuns, the maximum drop being as much as 6 feet.

Special measures are employed to free the tire from the tools, but into these means it is unnecessary to enter.

The tire blank thus formed is of the depth, as before stated, of the width of the finished tire, and is of about double its thickness, and half its diameter. This blank is then carried to the rolling machine.

As is well known, when straight tire bars are rolled through ordinary rolls, the diminution in section and the elongation of the bars are produced by passing those bars through successive grooves cut in the circumference of a pair of rolls, each groove being smaller than the preceding one; the distance apart of the rollers, center to center, remaining the same throughout the operation. In rolling plates, though the rolls are brought nearer together each time the plate has passed through, yet this is done when the plate has got clear of the rolls, but in circular rolling, where the hoop does not, as a rule, although an exception will have to be noticed, quit the groove into which it was first introduced, the pressure to produce the diminution of section has to be exerted while the iron is between the rolls.

In the few mills of this kind which are as yet at work, the application of the pressure has been effected in most cases by the use of screws worked by engine power; but in some instances hydraulic power has been employed, and I certainly give the preference to this latter mode.

In this mill, as in Bodmer's, the rolling is effected by the overhanging ends of the rollers. In the apparatus employed by him he preferred to have the axes of the rollers vertical. I believe there are some advantages in having them horizontal. The lower roller is the one external to the hoop to be rolled, and has no other movement than that of rotation, which it derives through a wabbler shaft from the coupling pinions in the usual way. The upper roller is the one internal to the hoop; this is caused to revolve in the same manner as the lower roller, but it has also rising and falling motions, which are effected by means of two hydraulic presses; the smaller one, that on the left hand, has, by the water pressure, an upward movement, which raises directly the end of the roll over which the press is situated, and indirectly, by the parallel motion levers, the outer end, or that which operates on the tire, and in this way the upper roll is lifted to admit of the introduction of the tire blank. As soon as this is done the pressure is removed from the small press; the top roll, with the rams of the two presses, then descends by gravity, allowing the water to run from a cistern above into the large press, so as to make it at once ready to be acted on by the pressure from the pumps, by which means the rolls are brought as desired closer together (always in a strictly parallel manner), until the tire is reduced in thickness and increased in diameter to the required extent.

These operations of putting on or taking off the pressure are performed with the greatest readiness by means of change valves.

The hoop in rolling is kept in form by means of the guide rollers, and these are moved away according as the tire increases in diameter. In the new machine now in course of construction, a self-acting apparatus is provided to traverse these rollers, and stop them when they have reached the position corresponding with the diameter of the intended tire.

In the way before described it will be seen a tire is made and rolled into a perfectly sound, smooth, and uniform ring, and, what is important above all, without its having any weleded joint to cause an accident by its unsoundness and fracture.

I have hitherto spoken of tires of wrought iron only, because it is to such tires alone that the weldless question attaches. It would, however, be improper in a paper of this kind to pass without notice steel tires, especially as the various improvements which have taken place in the last few years in the manufacture of steel bring that material day by day into more extensive use.

These tires are finished by circular rolling. Their preparation for this process is done, so far as I know, in one of the four following ways:—

The first is that which was pursued by M. Krupp, of Essen, and consisted in forging a bar of steel of the form of a tire hoop flattened together, then of cutting down the middle of such bar so as to admit of its being opened out into a hoop which could be placed on and finished in the rolling machine.

The second plan is that pursued by Mr. Bessemer, and consists in making an ingot of steel, hammering it, cutting off the end, and then forming a hole of such size as to admit of the portion so cut off being put on the rolling machine.

The third mode is that pursued by Messrs. Naylor & Vickers, of Sheffield, who, by their peculiar process, are enabled to cast steel into any required shape with the same perfection of result as has hitherto only been obtained in gun metal and iron and other metals melting at comparatively low temperatures. These cast tires are placed in the circular rolling machine and finished. Specimens of their steel castings are before the meeting.

The fourth mode is that pursued by Mr. Owen's company, which consists in casting a ring deeper than the width of the finished tire, and then hammering this ring down to that depth and into the form of a tire blank and finishing it by circular rolling.

I will only say one word more on circular rolling, and that is that I know of no reason why rings for boiler flues, and even for boilers themselves, should not be formed from weldless cylinders of perfect truth and uniform strength. Rings such as these would not weigh more than 8 cwt. to 9 cwt. each, a weight quite within the limits of manufacture.

As is well known, the transverse seams of a boiler are not the weak part—i is the longitudinal seams that are the great source of weakness. These seams, or even welded seams, would, by the weldless cylinder process of manufacture, be entirely dispensed with, and the safety of boilers thereby greatly increased, while the chance of leakage, corrosion, and weight of material would be much diminished. Mr. Bodmer proposed to finish boiler rings in this way, but they were to be formed out of flat plates bent round and having the ends welded.

FOREIGN SUMMARY.

The *Mining Journal* says:—M. Jennel has discovered a new way of easily ascertaining whether there exists any lead in the tin used for tinning culinary vessels in hospitals. His method consists in this:—Take about five decigrams of scrapings of the metal to be tested, and boil it in an excess of nitric acid diluted with one-third of its weight of water. When the solution is complete, filter and then put in a crystal of iodide of potassium. If the liquid contains but a ten-thousandth part of lead, a yellow precipitate will be formed, which will not disappear by the addition of an excess of ammonia.

Hot-air Engine.—MM. Burdin and Bourget have presented, for the opinion of the Academy of Science of France, a plan of hot-air engine, from which they believe an economy of at least one-half the fuel may be obtained, and which they desire to construct and experiment upon at the expense of the Government. The plan has simplicity at least. "Let there be an ordinary furnace, such as is used for steam-engine boilers, the products of combustion of which escape into the chimney, after descending along an inclined plane. Let the atmospheric air be first compressed to two atmospheres in small parallel tubes lodged in the flue, the air entering at the lowest point, and consequently rising." Then follows a very rational calculation of the length and diameter of the tubes necessary, and a more complicated account of the engine. The theory is excellent; if it should succeed in practice we will return to it.

Patent Window Cleaner.—An ingenious instrument for cleaning windows of every description has been lately invented in England. It consists of a long wooden rod, with an elbow joint, and the person using it has no need either to stand or even to sit on the window sill. The long arm is supplied with a nut and double cord, and the short arm has a movable bolt on it, to which may be attached a brush, sponge, or wash-leather; and by moving the nut up and down the brush or other article on the short arm is brought in contact with the window panes. The instrument seems to answer its purpose admirably. It is light, portable, adapts itself to any angle and any sized window; and what is most important of all, its manufacture will not cost at the utmost more than $2 50. The inventor and patentee is Mr. Smeaton, of Birkenhead, opposite Liverpool.

Corn Pits.—At a meeting of the Academy of Sciences, held in Paris, a letter from M. de Semchoff, a Russian landholder, was read, describing the manner in which corn pits are made in that country. The pit is dug in a dry soil, and, instead of masonry, the sides are hardened by a long-continued exposure to a wood fire. Before the corn is introduced, the air in the pit is rarefied by burning some straw in it, after which the grain is thrown in packed close, and the pit tightly inclosed. Corn has been preserved in such pits for forty years. Some of our Western farmers, who raise larger crops of wheat and corn, should try this new method of preserving grain during years when there is a great yield, in order to lay up a store for seasons of inferior yield.

Curiosities of Trade.—In Birmingham a great deal of japanned ware is made for foreign markets, and it is a curious and interesting study to notice the varied styles of art most popular. For Brazil the most saleable ornament is a shield surmounted by a crown and encircled with coffee berries. For South America, bright gaudy colors are mostly in demand. In Spain, the most favorite ornament is the representation of a bird. It would seem that the artists are not particular in following out the plumage of the birds they represent; the colors must be gaudy, and the Spaniards cannot but be impressed with the specimens of their ornithology.

It might be supposed there was now little danger of the explosion of shells fired at the siege of Sebastopol and which had remained exposed ever since to the rains and snows of the Crimea, but the *Odessa Courier* says that accidents continue to occur from the bursting of such shells, and states a case of recent occurence. Some boys found a shell in the neighborhood of Bastion No. 4, and began to roll it in the direction of the town. It struck against a stone and instantly burst. Luckily no one was hurt, although one of the boys was so near the shell that his clothes were set on fire by the explosion.

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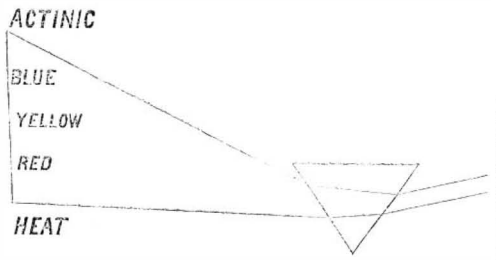
TYNDALL ON RADIATION.

The idea that heat is a vibratory motion among the particles of the heated body was suggested by Bacon, Locke, Count Rumford and others, but the full development of the theory has been reserved for the philosophers of the present generation, and, among these, the one who has taken hold of the subject with the most zeal, is John Tyndall, F. R. S., Professor of Natural Philosophy in the Royal Institution and in the Royal School of Mines. On the 16th of May, 1865, Professor Tyndall delivered a lecture in the Senate house before the University of Cambridge, England, on radiation, in which the mechanical theory of heat was very clearly set forth, and in which he has also gave the results of some original researches in regard to the transmission of heat through various liquids and vapors—facts of great interest and value apart from their connection with any theory. The lecture has been published in the form of a neat pamphlet of 48 pages, by D. Appleton & Co., New York.

As the lecture makes constant reference to the distribution of the different rays of the sunbeam in the spectrum, we have had a diagram of the spectrum engraved, in order to bring this distribution directly under the eye of every reader. The sunbeam is represented coming from the right, and passing through the triangular prism of glass, where it is bent from its straight track, some of the rays being refracted more than others, so that it is spread out or dispersed, forming an elongated image of brilliant colors, called the spectrum. Sir Isaac Newton counted seven colors in the solar spectrum, but only three of these—red, yellow, and blue—are now recognized as primitive, the others being formed by mixtures of these.



INVISIBLE RADIATION.

The first chapter of Professor Tyndall's lecture is devoted to a consideration of the invisible rays of the sunbeam, those of heat at one end of the spectrum, and the actinic rays which form the photographic picture and produce other chemical changes, at the opposite end. These rays are both distributed throughout the visible spectrum, but the maximum heat is beyond the red, while the actinic rays, though reaching a maximum in the violet, extend into the dark beyond.

THE MECHANICAL THEORY OF HEAT.

The theory that heat, light, electricity and other forces are simply modes of motion, being the most absorbing problem to the greatest intellects of the age, we give the statement of this theory in Professor Tyndall's own words:—

"When we see a platinum wire raised gradually to a white heat, and emitting in succession all the colors of the spectrum, we are simply conscious of a series of changes in the condition of our eyes. We do not see the actions in which these successive colors originate, but the mind irresistibly infers that the appearance of the colors corresponds to certain cotemporaneous changes in the wire. What is the nature of these changes? In virtue of what condition does the wire radiate at all? We must now look from the wire as a whole to its constituent atoms. Could we see those atoms, even before the electric current has begun to act upon them, we should find them in a state of vibration. In this vibration indeed consists such warmth as the wire then possesses. Locke enunciated this idea with great precision, and it seems placed beyond the pale of doubt by the excellent quantitative researches of Mr. Joule. 'Heat,' says Locke, 'is a very brisk agitation of the insensible parts of the object, which produce in us that sensation from which we denominate the object hot: so what in our sensation is heat in the object is nothing but motion.' When the electric current, still feeble, begins to pass through the wire, its first act is to intensify the vibrations already existing, by causing the atoms to swing through wider ranges. Technically speaking, the amplitudes of the oscillations are increased. The current does this, however, without altering the period of the old vibrations, or the time in which they were accomplished. But, besides intensifying the old vibrations, the current generates new and more rapid ones, and when a certain definite rapidity has been attained the wire begins to glow. The color first exhibited is red, which corresponds to the lowest rate of vibration of which the eye is able to take cognizance. By augmenting the strength of the electric current, more rapid vibrations are introduced, and orange rays appear. A quicker rate of vibration produces yellow, a still quicker green, and by further augmenting the rapidity we pass through blue, indigo and violet, to the extreme ultra-violet rays.

"Such are the changes which science recognizes in the wire itself, as concurrent with the visual changes taking place in the eye. But what connects the wire with this organ? By what means does it send such intelligence of its varying condition to the optic nerve? Heat being, as defined by Locke, 'a very brisk agitation of the insensible parts of an object,' it is readily conceivable that on touching a heated body the agitation may communicate itself to the adjacent nerves, and announce itself to them as light or heat. But the optic nerve does not touch the hot platinum, and hence the pertinence of the question, By what agency are the vibrations of the wire transmitted to the eye?

"The answer to this question involves, perhaps, the most important physical conception that the mind of man has yet achieved; the conception of a medium filling space and fitted mechanically for the transmission of the vibration of light and heat, as air is fitted for the transmission of sound. This medium is called the luminiferous ether. Every shock of every atom of our platinum wire raises in this ether a wave, which speeds through it at the rate of 186,000 miles a second. The ether suffers no rupture of continuity at the surface of the eye, the inter-molecular spaces of the various humors are filled with it; hence the waves generated by the glowing platinum can cross these humors and impinge on the optic nerve at the back of the eye. Thus the sensation of light reduces itself to the communication of motion. Up to this point we deal with pure mechanics; but the subsequent translation of the shock of the ethereal waves into consciousness eludes the analysis of science. As an oar dipping into the Cam generates systems of waves, which, speeding from the center of disturbance, finally stir the sedges on the river's bank, so do the vibrating atoms generate in the surrounding ether undulations, which finally stir the filaments of the retina. The motion thus imparted is transmitted with measurable, and not very great, velocity to the brain, where, by process which science does not even tend to unravel, the tremor of the nervous matter is converted into the conscious impression of light.

"Darkness might then be defined as ether at rest; light as ether in motion. But in reality the ether is never at rest, for in the absence of light-waves we have heat-waves always speeding through it. In the spaces of the universe both classes of undulations incessantly commingle. Here the waves issuing from uncounted centers cross, coincide, oppose, and pass through each other, without confusion or ultimate extinction. The waves from the zenith do not jostle out of existence those from the horizon, and every star is seen across the entanglement of wave motions produced by all other stars. It is the ceaseless thrill which those distant orbs collectively create in the ether, which constitutes what we call the temperature of space. As the air of a room accommodates itself to the requirements of an orchestra, transmitting each vibration of every pipe and string, so does the inter-stellar ether accommodate itself to the requirements of light and heat. Its waves mingle in space without disorder, each being endowed with an individuality as indestructible as if it alone had disturbed the universal repose.

"All vagueness with regard to the use of the terms radiation and absorption will now disappear. Radiation is the communication of vibratory motion to the ether, and when a body is said to be chilled by radiation, as, for example, the grass of a meadow on a starlight night, the meaning is, that the molecules of the grass have lost a portion of their motion, by imparting it to the medium in which they vibrate. On the other hand, the waves of ether once generated may so strike against the molecules of a body exposed to their action as to yield up their motion to the latter; and in this transfer of the motion from the ether to the molecules consists the absorption of radiant heat. All the phenomena of heat are in this way reducible to interchanges of motion; and it is purely as the recipients or the donors of this motion, that we ourselves become conscious of the action of heat and cold."

We shall give some account of Professor Tyndall's experiments in a subsequent number.

THE WAY DRY GOODS ARE SOLD IN NEW YORK.

Between the manufacturer and consumer, dry goods pass through the hands of three classes of traders—commission merchants, jobbers, and retailers. Commission merchants sell by the case or bale, jobbers by the piece, and retailers in any quantities desired by the consumer.

COMMISSION MERCHANTS.

The commission merchant receives his goods on consignment from the manufacturer. Each consignment is accompanied or preceded by a letter announcing the shipment, and containing an invoice or list of the bales or cases, with the number of yards in each, and a description of the goods—whether sheetings, shirtings, calicoes—whether bleached or brown—the width and other particulars. The terms on which the consignment is made, are stated in the heading of the invoice, and this is, therefore, an important business document. The following is the usual form:—

Invoice of 3 cases ⅞ths bleached shirtings, consigned to Messrs. Bradley & Howe, for sale and guaranty on commission.

[H]	No. 351	716 yds.
	352	713
	353	722
		2,151@30c., $645 30.

A. & W. SPRAGUE.

Providence, Oct. 28, 1865.

Some manufacturers give instructions positively limiting the price at which the goods shall be sold, while others leave the sale entirely to the judgment of the commission merchant. If the commission merchant makes advances on the goods, he then becomes the principal party in interest, and the disposal of the merchandise is intrusted to his discretion. A few very wealthy manufacturers have abundant capital for their business, and never ask any money on their goods until they are sold; but the great mass of mill owners are short of capital, and make a practice of getting advances from their commission merchant so soon as the goods are sent to market. These advances are made in the form of acceptances, and in the old credit days acceptances were generally drawn payable six months from date, in this form:—

$3,000 PROVIDENCE, October 28, 1865.

Six months after date, for value received, pay to our own order three thousand dollars, and charge to account of

Yours respectfully,
A. & W. SPRAGUE.

Messrs. Bradley & Howe, New York.

This is a draft of A. & W. Sprague, and when Bradley & Howe have written the name of their firm on its face, it becomes their acceptance. If the drawers dispose of it to third parties, they are held for its payment in case it should not be paid by the acceptors. The usual charge made by commission merchants to manufacturers for selling goods, is 2½ per cent, and, if they guarantee the payment, 2½ per cent more. On the receipt of the goods, the cases are compared with the invoice, one case is opened to display the goods in the store, and the others are sent into the basement or into the loft for storage. When a jobber comes in, he buys such number of cases or bales as he wants, which are sent to his store with a bill. The jobber's clerks open the cases and take an account of the yards marked on each piece to see if the bill states the quantity of merchandise correctly, generally measuring two or three of the pieces to make sure that the manufacturer gives just measure. Before the war, goods were sold by commission merchants on eight months' credit. After the goods were examined, the jobber would send his note to the commission merchant payable

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eight months after date. At the end of every six months, the commission merchant made out an account of his sales, with a calculation of the average time of payment, the manufacturer would draw on him for the amount payable at that time, and he would accept the draft. Now the credit given to the jobber is only thirty days, no note is usually given, but at the end of the thirty days payment is made by a check on a bank. The manufacturer receiving payment in full for his goods in thirty days, has less need of advances than formerly, and the cash system is full of advantages to all parties.

JOBBERS.

The jobber sells to retailers, of course mostly in the country, generally by the piece, though to some extent by the bale or case. Formerly the usual credit given by jobbers was ten months, ranging, however, from six to twelve. During the war jobbers' sales have been made mostly for cash, but the credit system is now being rapidly revived, and immense quantities of goods are being sold to retail dealers, living in all parts of the country, from Maine to Texas, on a credit of four and six months. If this credit system becomes general before the currency is restored, we shall have a terrible crash when specie payments are resumed, but if the restoration is made while the cash system prevails, it will be the cause of few if any bankruptcies.

Eight Hours a Day.

A correspondent of *Fincher's Trades Review* thus argues in favor of shorter hours for labor:—

"What time does a man have for either improvement or recreation, especially in the winter season, when he is obliged to be up and swallow his breakfast before daylight in order to be at his work at seven o'clock, with a scant hour's rest at noon, and that principally devoted to a walk home and back, and by swallowing his dinner in the quickest possible time imaginable, then returning home again in the evening long after darkness has set in, and after partaking of his evening meal, and attending to the various duties too numerous to mention that are incumbent upon him as the head of a family, what time, I ask, does a man have for either recreation or improvement? and who can estimate the value the workingman gives through his industry to his country? It is his strong arm that always defends it when its honor is at stake, and it is the labor and brains of a country that makes its honor and establishes for it a good name; and the workingmen, by asking for eight hours as a legal day's work, are barely asking for an equivalent in return.

"This question is one which I think mechanics are unanimous on. The movement is a very important one in whatever light it is viewed. The difference between hurrying away to work at seven in the morning and going comfortably at eight, is of no small importance, especially if the man has a family; also if he could return home in the evening at five o'clock instead of six. When this concession is made to mechanics, who will not rejoice? The mechanic will then cheerfully devote eight hours of earnest labor to his employer, and the latter will receive, in many cases, as much labor from the employee."

[We are for eight hours a day, or for six, or for four, provided, in that time, the mechanic can earn as much, and support his family as comfortably, as he now does. It is not a question of concession on either side, but of ability. If the manufacturer can get his orders filled on eight-hours-a-day labor, he will be as willing to "knock off" two hours sooner as any man in his employ. The best way to settle this question is to try the experiment.—EDS.

EXPERIMENTS have been made at Birmingham, to try the effects of magnesium light when attached to a balloon in the air. The experiments were very striking in their effects, the light thrown forth being most brilliant, lighting up the whole heavens, and illuminating the streets, houses, and crowds of people with a distinctness almost equal to day.

TWO IRON plates, four feet in diameter and weighing 1,600 pounds, revolving eighty times in a minute, send sufficient heat up a furnace to warm a large factory. They are turned by a band and a water wheel, and last for years.

Correspondence

True Explanation of the Ball and Jet.

MESSRS. EDITORS:—Having interested myself for a time, several years ago, with the experiment known as the "Jet and Ball," my attention was naturally drawn to the inquiry of your correspondent, "C. H. A.," on page 20 of the current volume of the SCIENTIFIC AMERICAN; and if you find the following a clear explanation of the subject, it is at your disposal.

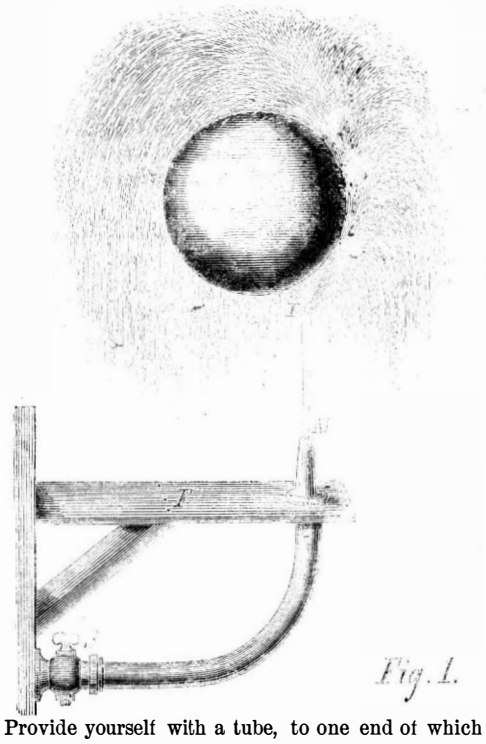

Fig. 1.

Provide yourself with a tube, to one end of which is fixed a nozzle, the orifice of which is about the sixteenth of an inch in diameter, and attach the tube to a fountain so that a smooth jet may rise perpendicularly about five feet above the end of the nozzle. If now you place a cork ball, one or one and a half inches in diameter, in the jet, half way up, it will be supported by the water, as shown in Fig. 1, and will revolve rapidly around its horizontal diameter.

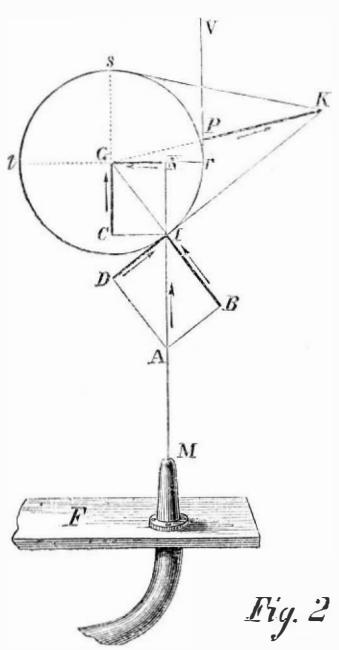

Fig. 2

If you wish to vary the experiment, in place of the ball, put a small ring of the same material, two inches or more in diameter, half an inch wide, and an eighth of an inch thick; and the effect will be even more pleasing than before. With a little skill and patience a small bullet or buckshot may be upheld in the same manner. Now remove the tube from the fountain and, having prepared a small cork ball the third of an inch through, by blowing gently through the tube a column of air will be found as effectual in sustaining this ball as was the jet of water in the first instance; and, if your lungs are tolerably good, it also may be replaced, by a small round pebble, about the size of the buckshot, which will be supported two inches or so above the end of the nozzle, constantly vibrating up and down, and rapidly changing its position, on the jet, from side to side. This motion will often cause it to appear as if revolving around its vertical instead of horizontal axis.

M I, Fig. 1 is intended to represent the jet as it strikes the ball, O. The stop-cock, S, is for the purpose of regulating the flow of water from the fountain. The stage, F, supports the nozzle, M, firmly, that there may be no undulating motion communicated to the jet.

Now, let the direction of the jet, and the direction with which it strikes the ball, be represented by the line, A I, Fig. 2. This force may be resolved into, or is equivalent to, two others, viz., D I, in the direction of a tangent to the circumference at I, the point of contact, and B I, in the direction of the radius that extends from the center to the point of contact. The force, D I, will be expended in causing the ball to revolve, while B I will act on the center of gravity, G. In drawing the figure, we have made B I equal to G I, therefore the demonstration will not be impaired if we use G I, in place of B I, which, for convenience, we will hereafter do. The force, B I, also, or its equal, I G, may be resolved into two others, viz., C G, parallel to the direction of the jet, M I, and N G perpendicular to the direction of the jet. The former of these, C G, is employed in supporting the center of gravity or elevating it, as the case may be; but it is evident that N G, the latter, tends to throw the ball off the jet, in a lateral direction. We have now four forces—first, D I, the *rotary force*; second, the weight of the ball, the *depressing force*—this, however, is counterbalanced by the *elevating force*, C G, which is the third; and, fourth, the *repelling force*, N G. One is yet lacking, viz., a *drawing force*, to neutralize N G, and thereby hold the ball against the jet.

Imagine now a small steel spring to be fastened by one end to the jet, at I, and the other end to extend toward K. If such a spring could be so fastened, and the end, K, were drawn around the ball and secured at *t*, its tendency would be to throw the ball in the direction of P K. Between I and *r* it would tend to *draw* the ball toward the jet, and also to depress it. Between *r* and *s*, it would tend to *draw* and *elevate*. Between *s* and *t* to *repel* and *elevate*. The resultant of the three would be represented by P K. When the water strikes the revolving ball the effect of the centrifugal motion would be to throw it off in the direction of the lines, I K, *r* V, etc.: much of it, however, adheres to the ball and is drawn around with it, and by its *reaction* produces an effect precisely analogous to the spring which we imagined to be fastened at I, and as a comparatively small part of the water is carried beyond *s*, our resultant will lie in the direction from P to K. This, then, is our fifth force by which N G is counterbalanced, and the ball retained in contact with the jet. To prove that it is this adhesion of the water to the surface of the ball and its reaction which constitutes *drawing force*, let the ball be made as smooth as possible and well oiled, and you can no longer succeed in supporting it upon the jet. MORRIS PECK.

Cincinnati, Ohio, Sept. 29, 1865.

The Crackling of Roofs in Cold Nights.

MESSRS. EDITORS:—I like to read the questions and answers propounded and given in your columns, and have always considered myself able to answer all of a philosophical or chemical nature. One thing has always puzzled me, and I have hoped it would be "brought up." When the thermometer ranges from 10° to 25° below zero noises are heard proceeding from the shingle roofs of buildings, and nearly every one knows that they are occasioned by the nails in the saddle boards drawing out. I have never seen one drawn out, but have noticed them standing up nearly their whole length. I cannot understand what, in the absence of heat, should impart motion and sound. Will you, or some of your readers, give me the solution? A SUBSCRIBER.

Batavia, Ill., Sept. 23, 1865.

[At neither 10° nor 25° below zero is there absence of heat. Professor Rankine says that the total pri-

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vation of heat is now estimated at 493°. 2 Fah. below the temperature of melting ice—the temperature of melting ice being 32° above zero. By cooling, the nails would be shortened, and as the heads could not be drawn into the board, the points must be started out. Once started, the tapering form of the nails would naturally cause them to be pushed outward by the alternate expansion and contraction from changes of temperature.—EDS.

Picking Cotton by Machinery.

MESSRS. EDITORS:—I notice in a late number of your journal a great deal said by correspondents concerning the invention of a machine for picking cotton. Allow me, if you think it worthy, to add my mite.

For six or seven years prior to 1862 I had been employed most of the time as a stationary engineer on some of the largest cotton and sugar plantations of the Gulf States. In the Brazos river country, in Texas, I first turned my attention to the picking of cotton by machinery. In this locality the cotton grows so large that a man on horseback cannot touch the tops of the plants if standing up in the stirrups. It was not a fair place to test an apparatus of this kind, but still I gathered some ideas that may be of benefit to inventors that have not been acquainted with the many obstacles to be overcome. My machine consists of a movable arm attached to a belt about the waist of the operator capable of being moved in any direction. I had a small pulley attached to each end; the one nearest to the body was fast to its axle, with a crank for the operator to turn. Over the two pulleys a leather belt was stretched, to the surface of which were wires inserted the same as a common cotton card, by turning the crank. The belt caught the cotton, then it was placed in contact with the end of the pod or boll, and delivered in a bag around the waist of the person carrying it. I found, as long as I could find bolls fully open and in reach, without bringing the arm in contact with the limbs or stems of the plant, it did well, as it would reach to the top of the plant and convey the cotton to the bag with great rapidity. I taught a smart negro woman to use it, and I gave it a thorough trial, but it was the slowest picker in the field, and the overseer said, "It wasn't worth shucks;" it was declared a "humbug," and thrown aside. Other kinds of machines were used or tried, but all abandoned.

I am not discouraged, and believe it will yet be done; but the inventor will find it much harder to do than it looks, as they are many natural difficulties to overcome that will have to be tried in the field. To be comprehended, I note a few, as follows:—In the greatest cotton-growing regions of the South the plant attains the hight of from five to seven feet, and when planted in rows, six feet apart, the branches of the stalks interlock in the middle of the row, and any great force would break the stems or cause the bowls to fall. It does not all ripen at once, but requires going over from three to five times to secure all the cotton. It ripens first on the top and extreme ends of the limbs, as these parts are sooner matured by exposure to the sun. In the first picking the bolls are hard and firm, only open at the ends, requiring a firm grasp with the ends of the fingers and a peculiar knack, only to be acquired by practice, to procure all the cotton without going through the operation twice, grasping both hands on the same pod, which would be a loss of time. In the two next pickings the cotton is opened wide, and is of more easy access, as far as taking it from the boll is concerned, but then the arm has to be run in toward the center of the plant to secure the inside bolls. I do not see how a machine could be made to do it without breaking the stems or clogging the machinery. In all parts, where cotton grows, is a vine, which, if not our morning glory of the North, it is a plant very similar, having long, slender, but very strong tendrils, running upon and entwining itself around the stems of the cotton stalks. This will interfere more or less with the rapid working of the operator, and machinery. In the last picking comes the tug of war. This takes place in the Gulf States in the latter part of November, and often as late as the last of December. It is generally accompanied with plenty of mud and rain; the bolls are rotten, and drop at the touch, or pull off with the cotton. The lower bolls are the last to ripen, and hang down in the mud. This cotton is not worth more than half what the first picking is, and is twice as hard to gather. W. R. A.

Steuben, Ohio, Oct. 5, 1865.

New Method of Ascertaining the Hight of the Earth's Atmosphere.

MESSRS. EDITORS:—As the hight of the earth's atmosphere is still a debatable question, I would suggest a new method to determine the hight of the same. Joule concludes, from experiments on gases, etc., that the absolute zero of heat (absolute cold) is 459° Fah., or 491° below the freezing point of water, and that at such a temperature atmospheric air changes from a gas to a liquid, solid, or non-elastic. The greatest degree of cold that has yet been produced artificially is 280°; but the proof is so clear that Joule's deduction is correct that there can scarcely be a doubt on that point. Accepting it as reliable, it looks as though it might furnish data to accurately measure the hight of the earth's atmosphere. "It is well known from observation that the air diminishes in temperature as we ascend at the rate of about one degree Fahrenheit for each 300 feet."—Prof. Henry, Agricultural Patent-office Report for the year 1853, page 464.

Then, if a sufficient altitude is attained to bring the temperature down to 459°, this altitude would be the upper limit of the earth's atmosphere, for beyond this limit the atmosphere could not exist as a gas, and, of course, not as a solid.

By this mode of figuring, at the equator, where the mean temperature of the air at the earth's surface is for 24 hours, say, 70°, the hight of the atmosphere would be a fraction over 30 miles high; and at or near the poles, where the mean temperature for a given day is zero, the hight of the atmosphere on that day at that point would be a fraction over 26 miles.

Scarcely any two authorities agree as to the hight of the earth's atmosphere. Olmsted does not place its hight at any definite point, but leaves one to infer that it may be a hundred miles or more; but says:—"With regard to the actual hight of the atmosphere above the earth, it is not a point easily determined. Efforts have been made to ascertain its hight by means of twilight, but no great reliance is placed upon this method by those who are most competent to judge of it."

Draper says:—"The atmosphere terminates at an altitude of about 50 miles."

Cooke says of the hight of the atmosphere:—"There is probably a limit to the upper surface of our atmosphere as definite as that of the surface of the ocean. At this elevation the repulsive force of the particles is supposed to be balanced by their gravitation toward the earth. If we assume that, at this point, the repulsive force is equal to a column of mercury one millimeter high, we can easily calculate the hight of the atmosphere." This, he then calculates by geometrical progression, taking for data the hight of the barometer at different altitudes, and places the hight of the atmosphere at 29 miles.

"The hight of the earth's atmosphere is about 45 miles."—*American Encyclopedia*, Etc.

F. A. MORLEY.

New York, Oct. 5, 1865.

Queries for the Curious.

MESSRS. EDITORS:—It is gratifying to read the responses to my query, "Why does a razor, dipped in hot water, cut better?" But I have not yet seen the true solution. It is not that by being heated "the [microscopic] teeth become a finer saw, as suggested in your issue of October 14th, page 245—but that the razor expands more from the back to the edge than from side to side, and thus the angle between the sides is sharper than when the razor is cool.

I have abundant experience, so has every other "shaver" and "shavee," that a razor dipped in warm water *does* cut smoother, closer and easier than one not so dipped.

Now for another question:—

I am not a mechanic, and, of course, don't know "all" about the economy of cutting off at "one-ninth," etc., etc.; but I see that ship builders are very nicely particular about the way their ships *cleave* the water with their bows; and equally so as to how they *leave* the water with their sterns; and I have wondered again and again, why some lively locomotive and railway train builder didn't apply the same principle to his work. Why let a huge locomotive, with some hundred square feet of surface, *butt* against a head wind? (and it always has a head wind) And why let the cubic terminus of a train "suck" so heavily as to raise gravel stones from the track, as large as peas, higher than the platforms, whence they are often seen whirling like feathers in a gale? Wouldn't it be worth while to have a "small package" rear car, so shaped as to avoid the sudden vacuum made behind a swift-moving train? And, besides, wouldn't it be worth while to make the sides of the cars as smooth as the sides of a ship? R. C. M.

Oct. 16, 1865.

[Though the razor expands more from back to edge than from side to side, the expansion is in proportion to the dimensions, and would not alter the sharpness. The cross section of the edge is an isosceles triangle, and doubling both the base and hight, would not alter the angle at the apex.

So far as the car fronts are concerned, it would be an advantage to have them wedge-shaped as suggested, but to make the wedge of any utility it must be long, which would add immensely to the body without increasing its carrying capacity in the same ratio. Not only this, but every car would have to be so made, for that which is first on one trip is the last when the train returns. We have never seen gravel stones whisked about in the manner described. According to Nystrom a train which exposes 1,000 feet of surface to a brisk gale loses 20 horse-power when running at 25 miles an hour.—EDS.

Engines of the New Sloops.

MESSRS. EDITORS:—In your valuable paper of Oct. 14th I notice rather an extraordinary and wholly incorrect statement, signed by the editors. In the article on the "New Sloops of War" it is distinctly stated that the engines for that class of vessel are "back action," but, nevertheless, the remark appended contradicts this statement, and informs the public that the engines are "direct-acting horizontal engines, precisely similar to those used in factories every day." Allow me to state that the engines referred to in the "Notes" are as unlike those in use in factories as is possible to make them. The cylinders have each two piston rods extending over the shaft, one above and one below, their ends being secured to lugs forged on a crosshead opposite, which moves on slides cast on the channel way and bottom of the condenser. You doubtless had reference to the engines being built for the frigates of the *Wampanoag* class, which have cylinders of 100 inches in diameter, and a stroke of piston of 4 feet. These engines are "direct acting," and are entirely different in design and detail from those referred to in the "Notes." The vessels for which they are intended are also much larger. ENGINEER.

Brooklyn, N. Y., October, 1865.

Introduction of Patents.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of February 4, 1865, you state that "there is no law to compel the holder of a patent to put the patented article on sale within two years from the issue of the patent; but, in the face of that, I am told that if the article is not put on sale within two years the patent is null and void. J. H. P.

Hartford, Conn., Oct. 9, 1865.

[Our patent laws do not compel a patentee, unless he be a foreigner, to put on sale the patented article within any specified time. A foreigner who takes out a patent in this country must put the article on sale within eighteen months after the issue of his patent.—EDS.

The Sixth Sense.

MESSRS. EDITORS:—I notice in your last, among the scraps in "Foreign Summary," one giving Prof. Bennet's idea of a sixth sense—that of weight. Could not the tubes be easily selected by striking upon them, the difference in the sound given out by each being easily distinguished by the sense of hearing? J. A. G.

Albany, N. Y., Oct. 13, 1865.

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AWARD OF PREMIUMS AT THE AMERICAN INSTITUTE FAIR.

From the long list of premiums bestowed at the late Fair of the American Institute, we select the principal—those for which gold medals were given:—

Winslow, Griswold & Holley, Troy, N. Y. Bessemer cast steel.

Taghonic Iron Works, Housatonic, Mass. For the best Copake and Leste pig iron.

Capt. R. G. McDougall, No. 466 Cherry street. A model of an iron-clad ship of war for ocean service.

Woodward Steam Pump Manufacturing Co., No. 95 Bleecker street. The best steam pump.

George Dwight & Co., Springfield, Mass. Best double-acting steam pump.

Wm. D. Andrews & Bro., No. 414 Water street. The best centrifugal pump for draining, mining and bilge pumps.

Wm. D. Andrews & Bro., No. 414 Water street. Best oscillating engine.

New York Steam Engine Works, Twenty-third street, East River. Best portable engine and boiler.

Washington Iron Works, Newburgh, N. Y. An engine and saw-mill combined.

Clark's Steam and Fire-regulator Co. A patent steam and fire regulator.

Tallcott & Underhill, No. 170 Broadway. The best submerged water-wheel.

F. Gutekunst, Philadelphia, Pa. The best plain photograph.

Charles H. Williamson, Brooklyn, N. Y. The best imperial photograph.

M. R. Clapp, No. 455 Water street. The best steam fire engine.

Chambers, Brother & Co., Philadelphia. A clay-tempering brick-making machine.

M. J. Campbell, A. Campbell, Agent, No. 56 Gold street. Campbell's country printing press.

Webster & Co., No. 17 Dey street. An improvement in screw wrenches, embracing pipe and bolt cutters, pipe tongs, etc.

Hiram Tucker & Co, No. 59 John street and Nos. 117 and 119 Court street, Brooklyn. Bronzed iron chandeliers, lamps, brackets, etc.

New York Rock Drill Co., No. 152 Broadway. The best steam-power rock-drilling machine.

Boston Milling and Manufacturing Co., Boston. The best quartz crusher.

Fisher & Bird, No. 97 East Houston street. Marble mantels.

J. A. Fay & Co., Cincinnati, Ohio. The best scroll saw.

Convex Weaving Co., No. 97 Reade street. A loom for weaving irregular shapes.

English Spinning Roller Co., Biddeford, Me. A main cylinder and doffer grinder.

E. C. Cleveland, Worcester, Mass. A cloth-drying and tentering machine.

Hewes & Phillips, Newark, N. J, The best iron lathe slotting machines, gear cutter and shaping machines.

Richard Dudgeon, No. 24 Columbia street. The best double-acting steam hammer, hydraulic punches, lifting and pulley jacks.

H. Burden & Sons, Troy, N. Y. The best machine for making horseshoes.

Wm. J. Creamer & Son, No. 15 Platt street. Railroad safety brake.

Phelan & Collender, New York. Billiard table, combining elegance of design and durability of wormanship, with Phelan's combination cushions.

Ball, Black & Co., Broadway. A gold and silver service of plate.

Tiffany & Co., Nos. 550 and 552 Broadway. A silver service of plate.

Wm. Gee, corner Franklin and Elm. Patent soda-water apparatus.

American Bell Co., No. 32 Liberty street. Steel and bronzed metal bells, with Harrison's patent rotating hanging apparatus.

G. W. Hough, Dudley Observatory, Albany, N. Y. An automatic registering and printing barometer.

George Steck & Co., Nos. 113 and 115 Walker street. A grand piano-forte, for general superiority.

Driggs Patent Piano Co., No. 252 Ninth avenue. A square piano-forte, for general superiority.

Lindeman & Sons, No. 2 Le Roy place. Cycloid piano-forte, for novelty of construction and general excellence.

American Velvet Co., Nos. 26 and 28 Barclay street. Silk velvet and plush.

American Water-proof Cloth Co., No. 43 Barclay street. Cap robes, table covers, car and carriage seatings and carpeting.

Florence Sewing-machine Co., No. 505 Broadway. the best family sewing machine.

Carhart & Needham, Nos. 97 to 101 East Twenty-Third street. The best organ.

J. M. Pelton, No. 841 Broadway. The best cabinet organ; made by Peloubet & Son, Bloomfield, N. J.

Bishop Gutta-percha Co., No. 201 Broadway. For gutta-percha goods, telegraph cable, etc.

Wheeler & Wilson Manufacturing Co., No. 625 Broadway. The best button-hole machine.

Lamb Knitting-machine Co., Rochester, N. Y. A family knitting machine.

O. R. Ingersoll, Nos. 243 and 244 South street. A metallic life-boat.

A. A. Marks, No. 575 Broadway. Artificial limbs, for simplicity of construcrion and durability.

N. W. Ringsley, No. 28 East Twentieth street. An artificial palate.

Adriance, Platt & Co. The best mowing machine —"Buckeye."

John Gowans, No. 179 Water street. The best chronometer.

EXPERIMENTS ON THE EXPANSION OF STEAM.

BY CHAS. EMERY, ASSISTANT ENGINEER U. S. N.

[For the Scientific American.]

Few persons can agree in regard to the economy of working steam expansively, and even the opinions of well-known practical and scientific men are received with very great reluctance. Many persons have experimented, to satisfy themselves on the subject, but have arrived at various, and, often, at entirely different, results, as the back numbers bers of the SCIENTIFIC AMERICAN plainly show. The disparity must, evidently, be attributed to the various means employed, and to the different circumstances and conditions under which the trials were made. As was stated, in substance, in a late editorial of your journal, experiments on the expansion of steam must all be made upon the same basis and under like conditions, if it be desired to compare the results. The writer has had the privilege of assisting in the trial of many experiments on the subject, and desires, without advocating either side, to show in what manner and by what means any person may settle the question for himself, either by his own researches or understandingly examining those of others.

A practical problem may be stated as follows:—A certain amount of steam power is required to drive the wheels of a boat or locomotive, or the machinery of a manufactory, and it is desired to obtain such power at the least possible cost. We are, in this article, to confine ourselves to the relative costs of using steam at different grades of expansion, consequently all the details of the machinery used, not influencing this, must be agreed upon in the first place and remain constant throughout the experiments. In accordance with practical requirements, we will agree to make the power developed the same in each case, and compare together the several amounts of coal necessarily consumed to produce that power. We should use the same kind of coal, the same fireman and the same boiler, that no part of the loss or gain realized may be attributed to a change of either. We should use the steam at the same pressure in each instance. This is a condition not often observed, and, as it forms the chief source of error, it is the great point at issue. The pressure of steam should be the same because the cost of generating it would in each case be the same. If a person use one hundred pounds of steam, cut off at one-tenth of the stroke, in a large cylinder, what is to prevent him using the same pressure, during the full stroke, in a small cylinder; and, should this be done, to what could any loss or gain realized be attributed? Simply, we answer, to the expansion or non-expansion of the steam. But should such person use ten or twelve pounds pressure of steam, at full stroke, in the large cylinder, and compare it with one hundred pounds, cut off therein at one tenth of the stroke, would the gain in either case be due to the difference in the initial pressure or in the grade of expansion? Both would have an influence of course, but how can we agree what modification each would cause? All works on the steam engine show a theoretical gain by the use of high-pressure steam, independent of its expansion, and this has been proved to be true in practice; we have no right therefore, to claim this gain as one due to expansion, when it is evident that high-pressure steam can also be used non-expansively. We feel assured that any person, after thoughtfully examining this subject, will allow that in all comparative experiments, on the expansion of steam, the same initial pressure should be used. The most proper way to do this is to vary the diameter of the cylinder for each grade of expansion. In a steam flouring mill, or other establishment, where the resistance is tolerably constant, this question may be thoroughly tested by making, say two cylinders, so proportioned that, to do the work, one will require the steam cut off early in the stroke, and the other late, using the same pressure of steam, same-engine frame, connections and style of valve gear. The cost of the power may be determined by running for a long time, under the usual conditions, with each arrangement, or carefully and continuously for a few days. The boiler power should be in excess, when the steam can be kept at a constant pressure by the patent steam-damper regulator. [The last suggestion will be found useful in all cases whether experimenting or not.] The coal should be accurately weighed and fired regularly, and the quantity required will furnish a practical test of the cost of the power. If greater accuracy be desired, the feed water evaporated can be measured, and the indicator and dynamometer used.

Good pratical results can be obtained in a cheaper manner than the above, by varying the piston speed and using the same initial pressure in the cylinder at different degrees of expansion. To do this, and preserve the speed of the shafting and machinery, the belt or gear wheels connecting the same with the engine must be differently proportioned in each case. In many establishments, wheels are lying unused which might be applied for this purpose. Often, by uncoupling a section of the main shafting, near the engine, and driving from the engine side a countershaft, which should in its turn drive the remainder of the shafting the speed of the engine can be varied by a simple change of pulleys. The manner of accomplishing the object must, of course, vary with the circumstances. For slow piston speeds, the steam must follow farther to do the work than when the engine is running more rapidly; the initial pressure of steam and other conditions being alike. Experiments can be tried quite readily, in this manner, with any engine which has means by which the point of cut off can be regulated, though this cannot be varied greatly, unless the engine be much too large for the work it has to do. This method of procedure, by varying the size of the cylinder, is much the best, and expansion can thereby be carried to any extent, but the losses due to increasing the piston speed are small, compared with the theoretical gains of expansion, and experiments on this plan can be tried with much less outlay. The friction pressure would be practically constant, at all speeds, whence the power necessary to overcome it would vary as the velocity, and could not be easily estimated. There would be no other losses, due to higher piston speed, when the cylinder ports were of sufficient capacity to admit the steam at the increased velocities. The power required to overcome the back pressure against the piston increases with the grade of expansion in all cases.

Space will not permit further remarks on this subject. If any of the readers of your journal should try experiments, in a manner substantially as above shown, it is hoped that an accurate record of the apparatus used, and of all the circumstances attending the trial, will be made, for the benefit of others, in order that abstracts of the same may be prepared for comparison.

New York, Oct. 19, 1865.

THERE is now a very large spot, distinctly visible to the unassisted eye at sun-setting, traversing the sun's disk. As it must be of enormous magnitude we hope to hear of further observations thereon.

PROGRESS.—The first negro student at Harvard College was admitted to the Freshman class on the 21st ult.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Governor for Steam Engines.—This governor belongs to that class which tends to equalize the action of the steam upon the engine by means entirely independent of said machinery, or the speed with which said machinery runs, and the action of which depends entirely upon the pressure of the steam in the boiler. If the pressure in the boiler rises, a valve in the steam pipe closes, and the quality of steam admitted to the engines is reduced, and *vice versa.* The governor consists of a piston working in a cylinder or tube which is secured in the upper part of a steam boiler. A spiral spring has a tendency to depress the piston, and the piston rod connects with a lever which is provided with a number of holes, from one of which a rod extends to a corresponding hole in an arm mounted on the end of the valve spindle. If the pressure of the steam rises, the piston is forced up against the action of the spring, and the valve partially closes, and *vice versa.* By changing the rod, connecting the lever with the arm on the valve spindle, the position of said valve can be regulated. James M. Rees, of Scott, Ohio, is the inventor.

Machine for Cutting Sheet Metal.—This invention consists in the use of two pairs of adjustable shears worked with a treadle or other suitable mechanism, and may properly be termed "beveling shears," for cutting the ends from curved pieces of sheet metal, and is intended to be used in connection with a "curve shear," which consists of two pairs of cutters, a crank, and cog wheels, and a clamp and radius bar, by which the curve is made to suit any pattern. The tin is put into the clamp and against a pair of gages, and by turning the crank the cutters draw the tin in and cut it in such a way that it is of an exact width and proper curve for the purpose intended. It is then put into the beveling shears, and both ends cut at once. Thus both curves are cut at once, and then both ends, when the piece is completed. The curve shear and beveling shear, are both readily adjusted to any flaring pattern, and the work can be cut with speed and accuracy, saving two-thirds or three-fourths of the time in cutting, avoiding all the marking and tying together. The curve shear can also be used to cut the curves, and the ends can be cut on a common squaring shear. The curve shear, with or without a circular and squaring attachment, and also the beveling shear, can be furnished soon after receiving an order, and all warranted to work well. Hosea Low, of Waukon, Iowa, is the inventor.

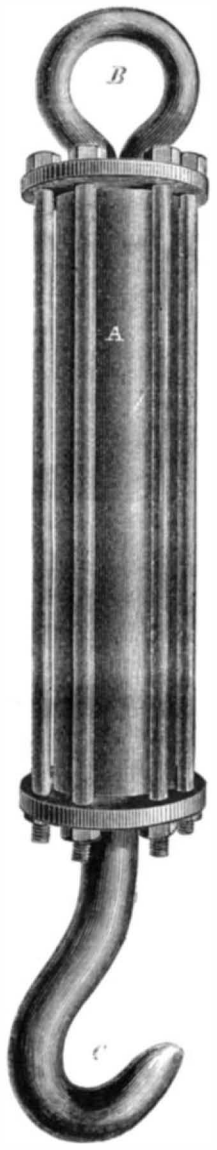
Sieve and Macerator.—This invention is a device for sifting and macerating substances designed especially for family use, for sifting flour, macerating and sifting pulp for pumpkin pies, and like purposes. The invention consists in constructing a vessel of cylindrical form provided with a handle and a scoop and with a detachable top. The bottom of said vessel being open and having a sieve applied to it in such a manner that it may be readily detached when necessary, and sieves of different sized meshes used; the above parts being used in connection with rollers provided with cutters, and all arranged in such a manner as to operate very efficiently. S. V. Gifford, of Hudson, N. Y., is the inventor.

Music Stand.—The object of this invention is to produce a music stand which shall be capable of being folded into a small compass so that it can be carried in the hand from place to place with convenience and ease, and it consists in constructing the several parts of the stand, so that when folded together they present the appearance of a cane, which can be carried by a musician to the place where he is to perform. Jacob David, No. 10 St. Felix street, Brooklyn, N. Y., is the inventor.

Corder for Sewing Machines.—This invention was patented on the 19th of Sept., 1865, by J. W. Brady, of Baltimore, Md. The corder, while attached to the front part of the machine, is so bent as to introduce the cord into the required position in the doubly-plaited fold of a shirt front and immediately in the rear of the needle. The shaft of the corder lies upon and flattens the fold, and being recurved, passes under it; being again bent, it reaches the point of discharge of the cord in the angle formed by the secondary fold of the cloth. The vertical and the two horizontal adjustments of the corder on the cloth plate are obtained by slotted arms and set screws in the frame which is attached to the sewing-machine table.

HOOVER'S GUM-ELASTIC SPRING.

The inventor of this spring asserts that it is a great improvement over those now in use, and that not only in principle, but in construction, it is the correct way to apply such devices. Horses which are set to drawing cars to be switched off, or otherwise, can, by the aid of this spring, start the load at once, whereas, it is affirmed, they would fail without it—the sudden check discouraging a horse so much that he gives it up. For coupling railway cars it is equal,



if not superior, to others in use, by reason of its gradual and even action, avoiding sudden jerks. For use on city cars they are claimed to be a great advantage, and also in plowing; where it is applied to the draft beam, all sudden strains, which seem as if they would wrench the arms out of the sockets, are greatly lessened if not entirely prevented.

The spring, in construction, is merely an india-rubber cylinder inclosed in the case, A, so that when the two parts—the ring, B, and the hook, C—are attached at different points, the rubber cylinder will be compressed in an obvious manner.

This invention was patented by S. M. Hoover, of Carlisle, Pa., on April 18, 1865; for further information address him at that place, where the springs are manufactured and can be had.

THE attention of hardware dealers and mechanics is directed to the Self-registering Calipers and Dividers, advertised by Kimball & Talbot, Worcester, Mass. We understand they are in use in some of the best shops in the country.

VARIATION of temperature does not occur in water below 120 feet.

ZIRCONIUM.

[Translated for the Scientific American from the Journal du Havre.

At a late session of the Academy of Sciences, Mr. Henri Saint-Claire Deville presented a remarkable essay, written by Mr. Troost, Professor of Chemistry at the Bonaparte Lyceum, upon the new metalloid—zirconium. This substance, to which mineralogists have given the name of "zirconium," and the jewelers call hyacinth, is the oxide of a simple substance hitherto very imperfectly known, notwithstanding the researches of Berzelius.

The illustrious Swedish chemist succeeded only in obtaining the radical of this earth in the form of an amorphous and grayish powder. Mr. Troost, however, taking advantage of the facilities provided in the laboratory of the normal school—thanks to the liberality of the Minister of Public Education—has been fortunate enough to see his efforts crowned with success in preparing zirconium in a crystallized state, while no chemist before him had been able to isolate it. The extraction of this new simple was attended with considerable difficulty, and, therefore, Mr. Troost's paper excited great interest among the chemists present at the meeting at which specimens of crystallized zirconium were laid before the Academy.

Mr. Troost succeeded in obtaining beautiful crystals by heating double fluoride of zirconium and potassium together with aluminum over a charcoal crucible to the temperature at which iron melts.

Zirconium is a very hard and brilliant substance, resembling antimony as to color, luster and brittleness. Its density is 4·65. Zirconium in its chemical properties approaches nearer to silicium than any other known simple substance. It withstands the action of oxygen at red heat, becomes slightly oxydized at white heat, and burns only when subjected to a gas flame through a blow pipe. It burns in chlorine at a dull heat. Cold acids have no action upon it, and warm acids affect it but slightly. Its true dissolvent is fluorhydric acid.

Like silicium and boron, zirconium presents three different physical conditions, viz., the amorphous, graphitoid, and crystallized.

In addition to making known the characteristics of a simple substance which has hitherto been little studied, Mr. Troost's able essay solves a question that had long remained undecided, despite the researches of his forerunners, viz., to ascertain whether the radical of zirconium belongs to the group of metals or that of metalloids. This essay will be read by chemists with the deepest interest. We can only here indicate the main results obtained, and commend its importance to the science of philosophical chemistry.

Car Brakes Operated by Electricity.

Mons. Achard, civil engineer, has invented a method of operating brakes so that they can be instantly applied to all the wheels of a train, by touching a small lever, which has the effect to break an electric circuit, and thereby release the brakes, which are then forced against the wheels by springs. I. the locomotive breaks from the train, or any coupling breaks, the electric wire will also break, and the detached cars will be stopped. The conductor, engineman, or any other attendant, can instantly release the brakes in case of danger; and it is suggested that passengers also may be allowed to do so—an allowance more allowable where the carriages are separate than where they are open through, like ours. This invention has been recommended to the Emperor for the prize of 50,000 francs offered for the best application of the Voltaic pile. The first trials of it were by order of the Minister of Public Works, and at the public expense; and the directors and engineers of the Eastern Railway Company aided in the practical improvements which made the invention successful. Since the preservation of life is the highest duty of railway managers, the invention of Mons. Achard should receive their serious consideration.—*Le Moniteur, Paris.*

THE project of placing steam traction engines on the roads across the plains this side of the Rocky Mountains is again receiving attention. As coal has been found in Colorado, it is hoped that the engines may now be profitably used. A company with a large capital has been formed for trying the experiment.

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HYDRAULIC LIFTS FOR WAREHOUSES.

In England water power is employed to a much greater extent for minor purposes than it is with us, We have published in former numbers of the SCIENTIFIC AMERICAN many instances where small turbines have been applied to blowing organs and driving light machinery. Other applications of water power are common abroad which are unknown here—as in hydraulic cranes, water engines, "hydraulic lifts," and similar machines. The water-rate is much lower in England than in this country; that is, the rent for so much water, annually, is less; but that is no reason why water power should not be introduced for many purposes where steam is now used.

Our large importers and jobbing houses on Broadway and other streets, use steam power to a great extent. In their, immense buildings are one or more hatchways, up and down which goods are continually sent from one story to another. To do the work, however, there must be a steam engine and boiler, which requires costly fuel, attendance, and supplies, and is, in dull seasons, an investment on which there is no return. By the use of water power for this purpose, these outlays would be unnecessary, and a comparatively simple system introduced in place of a complicated one. The saving to be made by this substitution lies not in an increase of power—for a pound of water, turned into steam, will do much more than the same quantity on a wheel—but in the conditions under which power is given out under the two plans there is a vast economy.

Ordinary steam engines burn from eight to ten pounds of coal per horse-power in one hour. By common engines we mean those constructed rudely, with improperly made and set valves, and in a bad state of repair, as nearly all engines used in warehouses are. At present prices of coal—$12 per tun—one horse-power would, therefore, cost 16⅔ cents per hour, exclusive of engineer's wages. A competent engineer ought to receive $3 per day at least; this would make a horse-power nearly $5 a day, without waste, packing, oil, repairs, supplies, or any incidental expenses whatever. This power must be maintained, ready for use, at all times, whether needed or not at the moment. It increases the rate of insurance, and is a continual source of anxiety.

It seems quite reasonable to deduce from these facts that it would be a saving to pay the Croton, or Cochituate, or Fairmount Water Works, ten times the amount they charge for one horse-power to users of steam. By the use of water power the wages of an engineer would be saved, no repairs of any moment would be needed, the rate of insurance would remain the same as in other buildings, there would be no liability of explosion, no great depreciation in value as there is by using a steam engine and boilers; and, what is of great importance, the power would be ready at all times, and could be managed by any person.

Of the means by which power is to be applied it is not necessary to speak. A stand pipe suggests itself as a simple and safe reservoir of power where head enough could be had to fill the pipe. From such a pipe a water engine, or turbine wheel, could be driven with no more gearing or mechanical fixtures than are in use at present.

In some cities there are printing presses running, driven by small turbine wheels. The New Haven *Palladium*, we are told, is printed on a press driven by a small turbine wheel; the supply pipe is one inch; the head we do not know.

This matter is worthy of attention by those principally interested.

THE VALUE OF ILLUSTRATIONS.

It is impossible to overrate the value of an engraving in rendering the details of any scene or locality intelligible. Pictorial newspapers are highly popular, and *Harper's Weekly* has, perhaps, given the public a clearer idea, through its engravings, of the war than all the letters of correspondents. As with scenes in still life, so with machines and mechanical subjects generally.

A patent claim is not just the reading one would take to the sea-side to while away a summer hour; but place before the reader of it a clear engraving of the cranks, levers and joints comprising the patentee's invention, and the whole thing is as plain as noonday. While there is much advantage in a mere wood cut, there is a greater in a fine engraving, which shows every detail as plainly as a microscope, and not only shows them, but gives each its proper light and shade, so that, instead of being a mere flat and spiritless representation of a machine, it is a work of art also. The value of such engravings to those who wish to dispose of their inventions is very great.

The SCIENTIFIC AMERICAN is read weekly by thousands of persons in this country and abroad. It goes to remote quarters of the globe—to India, China and the Sandwich Islands—and to other places not necessary to mention. The engravings in it are seen by men in all stations of life—by heavy hardware houses, which order goods by the tun; by the housewife, who sends for a dozen fruit jars, or the dealer, who orders a gross of bread cutters. The wants of the family, of the counting-room, of the banker, the carpenter, the founder, the farmer, the machinist, the blacksmith, the manufacturer and men of all trades, are numerous, and the way to supply them is for each one to make known what he offers for sale through these columns. The engravings are always accompanied by clear and impartial descriptions, and, from long experience, we know there is no better way for those who have useful inventions than to publish engravings of them in the SCIENTIFIC AMERICAN.

THE CHEMISTRY OF THE BESSEMER PROCESS.

Ores from which iron is obtained, are combinations of iron and oxygen—oxide of iron—a substance with properties entirely different from those of pure iron. Peroxide of iron is familar to every one in the form or iron rust, and a combination in a different proportion—the magnetic oxide—is familiar to all blacksmiths in the black scales which fall from red-hot iron. In obtaining malleable iron, the first step is to separate the metal from the oxygen, and this is done by bringing the ore in contact with carbon at a high heat, carbon having the property of taking oxygen from nearly every other substance if brought in contact with it at the proper temperature. The ore is first roasted in the open air to dry it thoroughly and to expel any sulphur that it may contain; it is then mixed with coal in a high furnace; the coal is set on fire, and a powerful blast of air is blown through the mass, burning the coal and heating the ore. In these conditions the oxygen leaves the iron and combines with the coal, forming carbonic oxide, which is a gas that floats away in the atmosphere. The iron is left free from oxygen, but fortunately not in the state of pure iron, for it combines with from two to five per cent of the carbon, forming carbide of iron or cast iron, a substance neither malleable nor ductile, but very hard and brittle, and far more easily melted than pure iron. This cast iron is melted by the heat of the furnace, and is drawn off into molds, forming pigs.

The next step in the process is to extract the carbon from the cast iron. This is done by melting the compound in contact with a current of air, and stirring it to bring fresh portions to the surface. The oxygen of the air combines with the carbon, forming carbonic oxide gas, which floats up the chimney, and the iron is left sufficiently pure to be malleable and ductile—being the wrought iron of commerce and the arts.

If the iron on coming from the puddling furnace should be allowed to cool slowly in large masses, it would crystallize, losing its strength and becoming brittle; it is, therefore, subjected to hammering or rolling, which breaks up the crystals, and tangles the particles together in a fibrous or homogeneous mass. The puddling and hammering also expel some other impurities, the principal being sulphur, phosphorus and silicium, the oxides of which are lighter than iron, and, therefore, rise to the surface of the molten mass, part of them passing up the chimney in the gaseous state, and others floating on the surface in the form of slag.

Steel is made by re-combining wrought iron with a portion of the carbon which has been laboriously extracted from it. This is done by putting iron and coal together in close vessels, and exposing them for a long time to a high temperature; the iron combines with 1½ to 1¾ per cent of carbon, and becomes steel. It is regarded as settled that a trace of nitrogen is also necessary in the combination to form steel.

The Bessemer process consists essentially in burning the carbon out of cast iron, by blowing air through the molten mass, instead of stirring the metal under a current of air which acts only upon the surface. The vessels are filled with melted cast iron to the depth of about 15 inches, and the air is forced in powerful currents into the bottom. Mr. Holley stated, in his recent paper, that the mechanical action of the air is quite as important as the chemical, it being necessary to blow the iron into spray in order to distribute the oxygen throughout the mass at once, thus generating an intense heat, keeping the iron perfectly fused after it is reduced, and expelling the impurities. The blast, is therefore, urged with a pressure of fifteen pounds to the inch, when four or five pounds would be sufficient to overcome the weight of the metal column. The proper quantity of carbon to form steel is introduced by mixing molten cast iron with the reduced metal.

The action of the all-important manganese- the use of which has made the Bessemer process a practical industry—does not seem to be fully settled. Mr. Mushett seems to think that when the carbon is nearly consumed, and the oxygen begins to burn the iron, if manganese is present the oxygen will combine with it in preference to the iron; but Professor Seely takes the ground that alloying the iron with manganese merely makes the molten mass more fluid, and allows the oxide of iron and other impurities to rise more freely to the surface, saying that the oxide of manganese would be an impurity as injurious as the oxide of iron.

AMOUNT OF PORK FROM A BUSHEL OF CORN.—The *Country Gentleman* says that an experimenter, J. B. Lawes, obtained 100 lbs. of pork from seven bushels of corn, or 1 lb. of pork from 4½ lbs. of corn; the grain was ground and moistened with water before feeding. Nathan G. Morgan, of Union Springs, by wetting his meal with five times its weight of hot water, and letting it stand twelve to eighteen hours before feeding, obtained 1 lb. of pork from 2½ lbs. of corn. Doubtless different results would be obtained from different breeds of swine.

SEVERAL steamboat companies running vessels on the Sound are to be consolidated in one, and are building some large steamers with huge engines. The cylinders are to be 110 inches in diameter and 12 feet stroke. and are to be built by the Etna Iron Works, New York City.

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THE FAIR OF THE AMERICAN INSTITUTE.

Although the Exhibition has closed, some objects which have escaped notice hitherto, are worthy of mention.

This Fair of the American Institute has been a most interesting one, and the display of machinery was particularly good. Machinists' tools are receiving much attention at the hands of parties in that line of business, and we remarked some fine specimens on exhibition. The best tools, in point of convenience, arrangement, and adaptation to the ends required, were shown by Messrs. Hewes & Philips. of Newark, N. J. We do not here allude to "polish" which is so attractive to some, but to standard excellence.

GEAR CUTTER.

The parties alluded to exhibit a gear cutter which is a very neat and convenient tool. The gear to be cut is carried on a spindle which projects at right angles from a vertical column, and the cutters are moved across beneath the gear, something like the platen of a slotting machine. There is also a slotting machine exhibited, the tool beam of which is counterbalanced by a weighted lever; this will make it work easier, besides having a tendency to prevent the tool from chattering, as it does sometimes with a light cut. Messrs. Hewes & Philips also manufacture steam engines and boilers and machinery in general.

A NOVEL VISE.

"Vice is a monster of such hideous mien,
That to be hated needs but to be seen."

Thus saith the poet, but it is quite evident that he had never seen this particular one, or he would have viewed it more favorably. The novelty of this vise consists in the method by which work is grasped in it. There is no screw, as usual, but in its place there is a dog or cam on the side, similar to that which is often used to fasten the rests of hand lathes. The work is quickly adjusted to this vise by pulling the jaws open, and then bringing the cam around against the beam, which not only holds the same, but draws it up against the solid jaw, so that the work is held tight. This is a very useful improvement. N. and A. P. Stevens, No. 74 John street, New York.

MORSE'S TWIST DRILLS.

These justly celebrated tools are exhibited by F. W. Bacon, No. 84 John street. Our readers can find an engraving of these drills on page 230 of the present number. They are turned twist drills, and are far superior to the common tools to be found in machine shops; they are neatly mounted on a circular block, and each one is numbered, so that there can be no mistake in the size; all metal workers should use them. The saving in time and the quality of the workmanship are very marked.

TREMPER'S "CHRONOMETER" GOVERNOR.

This governor is quite novel in its construction and principle, and differs materially from others in use. It is a governor and a cut-off, and lets on just as much steam as the work to be done requires. It is very quick in its action, and is highly approved by parties using it. In this governor the balls hang vertically, instead of standing at an angle, as usual, and there is but one joint between the balls and the valve, so that the force is not consumed in friction before reaching the desired point. It can be set to any speed at any moment without stopping the engine, and is a manifest improvement in this class of machines. John Tremper, No. 316 North Third street, Philadelphia.

CAMPBELL & HARDICK'S PUMP.

These parties exhibit steam pumps of novel design. One pattern is a complete steam engine, with a pump at the end of the bed plate, and another is a steam and water cylinder on the same bed plate—motion being given the piston by ingenious valve gearing. These pumps are easily repaired, as to their valves, if derangement occurs, it being stated that any carpenter can make a set of hard wood in a few minutes. No. 9 Adams street, Brooklyn, N. Y.

HICK'S PATENT MEASURE.

By the use of this utensil any quantity, from a gill to the contents of the vessel, can be measured in the same receptacle. A gallon pot, for instance, is fitted with a small rod running through the center; this rod has a float on it which connects with an index hand and plate on the top. So soon, therefore, as a liquid is poured in, the float rises and the quantity is known by reading the index, which is graduated accurately. In this way one vessel will measure different amounts. The arrangement is a very novel and ingenious one.

THE MAGIC TABLE.

This is a curious piece of furniture. To the eye it is a common black-walnut extension table, but by taking hold of one end it can be lifted up, when it is immediately transformed into a sideboard or a set of shelves, and, finally, folds up into a small compass, so that it looks like a wardrobe. J. Ziegler & Co., of No. 42 Bleecker street.

THRASHING MACHINE.

N. Palmer, of Livingston, N. Y., exhibits a model of a thrashing machine, possessing decidedly novel and valuable features. The grain is fed into the machine in a position parallel with the beating roller, which, in place of teeth, is fluted longitudinally, and runs in a concave provided with longitudinal ribs. The roller runs with high velocity and beats off the grain without breaking the straw to pieces, thus doing its work with less power than the old machines, and leaving the straw in better condition.

WOOD TURNING.

A. D. Waymoth, of Fitchburg, Mass,, has a small, simple lathe, capable of executing a great variety of operations. By changing the cutters it will make thread spools, druggists' boxes, tassel molds, pedal rods, piano pins, bonnet stands, handles, bungs, faucets, curtain fixtures, wooden balls for buttons, and numerous other articles. It turns out its work with remarkable rapidity and in great perfection.

Workshop Machinery.

The practical details of the machinery actually used in engineering establishments are worthy of the most careful consideration, and the more so because they are not usually set forth in such a way as to render them available ordinarily.

In most factories machines in great variety are used which are designed to serve especial purposes as well as general; thus, in Messrs. Ledger's factory, in 1855, a large planing machine was fitted with boring threads suitable for boring locomotive cylinders. This machinery, however, was not appreciated when the proprietors retired and sold the works, the oring heads were merely reckoned as old metal, though in connection with the planing machine as an adjunct, to which they were designed, they formed a valuable piece of machinery; and in all workshops such contrivances are constantly in requisition, although they are only suited in many cases to the particular works for which they are intended.

Many complicated mechanisms are brought forward which, although attracting the attention of the less practical part of the body of mechanical engineers, nevertheless has seldom come into general use, as machinery which proves most useful is that which is simplest and most durable.—*London Artizan.*

SPECIAL NOTICES.

Henry Jenkins, Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on the 13th day of January, 1852, for an improvement in ornamental connection of the posts of an iron fence.

Parties wishing to oppose the above extension must appear and show cause on the 25th day of December next, at 12 o'clock, M., when the petition will be heard.

Wendel Bollman, Baltimore, Md., has petitioned for the extension of a patent granted to him on the 6th day of January, 1852, for an improvement in construction of bridges.

Parties wishing to oppose the above extension must appear and show cause on the 18th of December next, at 12 o'clock, M., when the petition will be heard.

It is stated that the counterfeiters of the new fifty-cent national currency notes have adopted a shrewd plan. The counterfeit is an excellent one, and apt to deceive good judges; but in order the more effectually to deceive, they have spelt the word "designated," on the right corner, "disignated," on some of the notes, thus leaving many persons under the impression that all the counterfeits are so spelt and easily detected. This is all a mistake, and but very few of the notes have this misspelling on them

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 17, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

50,436.—Adjustable Weeding Hoe.—Alonzo C. Arnold, Norwalk, Conn.:

I claim the set screw, F, and plate, C, in combination with the slotted stem, G, in the manner and for the purpose substantially as herein described.

50,437.—Manufacture of Drinking Glasses.—J. S. and T. B. Atterbury, Pittsburgh, Pa.:

We claim as a new article of manufacture a glass vessel having a colored depression in its base in the likeness of a human face, or other figure, produced therein by the means substantially as described.

50,438.—Grain Drill and Cultivator Combined.—Edward Badlam, Ogdensburg, N. Y.:

I claim the combining and arranging of the cutter wheels, C C, on shaft, B, with the cultivator teeth as arranged on bars, F F, with the drill teeth, G G, seed boxes, I and O, and roller, P, and conducting tubes, H H, with the quadrangular frame, A, and wheels, M M, all combined and arranged in the manner and for the purpose herein set forth.

50,439.—Cultivator.—L. B. Barton, Metamora, Ill.:

First, I claim the combination and arrangement of the lever, h, beam, D, and double tree, P, as shown in Fig. 4.

Second, The lever, h, in combination with the double tree, P, rod, e, and beam, D, the latter having its front end pivoted to the main frame, and all the parts arranged to operate as and for the purpose herein set forth.

Third, The harrows, b, in combination with the central swinging plows, as shown and described.

Fourth, The combination and arrangement of the standard, L, lever, O, and cross-bar, B, as and for the purpose set forth.

50,440.—Horseshoe Machine.—Lewis H. Bigelow, Philadelphia, Pa.:

First, I claim the revolving cylinder, D, and its dies, b, in combination with the cylinder, D', its counter dies, f', sliding blocks, E, and springs, d, or the equivalent to the said springs, the whole being arranged and operating substantially as and for the purpose herein set forth.

Second, The spring bars, H H, with their flanged pulleys, g, in combination with the sliding blocks, E, and cylinder, D', the whole being arranged and operating substantially as and for the purpose herein set forth.

Third, The adjustable plates, I I, in combination with the adjustable vibrating cutter, L.

50,441.—Harvester.—Virgil W. Blanchard, Bridport, Vt.:

First, I claim the combination of the two wheels, E E, of unequal diameter, the spring, F, clutches, a b I, and wheels or pulleys, H H', all constructed and arranged to operate substantially as set forth.

Second, The arrangement of the springs, T T, on each side of the crank box at the upper end of the pitman, N, for the purpose specified.

Third, The combination of the wheel, R, and spring, S, when arranged in line with the shoe, Q, and wheel, D, as and for the purposes set forth.

Fourth, The combination of the counterpoise bar, N, pendant, O, brace bar, P, and loose joints, e f g h, arranged and operating substantially as and for the purposes set forth.

50,442.—Center Punch.—Milton Boucker, Fitchburg, Mass.:

I claim the improved shaft-centering apparatus, as composed of the levers, A A, the recessed jaws, B B, the punch, G, the punch carrier, C, the arms, E E, the toggles, D D, and the slider, F, arranged and jointed or applied together substantially in manner and so as to operate as specified.

50,443.—Balance Puppet Valve.—Richard C. Bristol, Chicago, Ill. Antedated Oct. 8, 1865:

I claim, in balance puppet valves, the ring or annulus, M, carried on one of the parts, a or b, of the valve, and adapted to yield to conform to its seat, and having its joint, m, protected by a yielding cover or shield, N, substantially in the manner and for the purpose herein set forth.

50,444.—Guitar Banjo.—Levi Brown, Baltimore, Md.:

I claim the construction of the head or drum of the instrument, as described and represented, and consisting of the perforated rim or hoop, imperforated sounding board and bulging back, constructed substantially as described.

50,445.—Journal Box.—John T. Bruen, New York City:

I claim constructing the bearing surface of the journal box of a corrugated or indentated configuration, substantially as and for the purpose herein set forth.

50,446.—Portable Fence.—Samuel Bryan, Jefferson, Wis.:

I claim the panels constructed and united in the manner shown and described.

50,447.—Flour Sifter.—Charles Burnham, Philadelphia, Pa.:

First, I claim arranging within a box having a semi-cylindrical sieve bottom a series of revolving tangential plates, h h, a portion of the surface of each one of which is curved, substantially as described.

Second, The combination of a brush, k, with the revolving plates, h h, which are so applied to radial arms that they serve as crushers and also stirrers, substantially as described.

Third, The combination of the revolving and stirring plates, h h, and a brush, k, applied to a shaft, d, which is allowed to have an upward yielding movement during the operation of sifting, substantially as described.

50,448.—Upsetting Press.—D. A. Boland, Pittsburgh, Pa.:

I claim, First, In an upsetting press, the head piece, M, when shaped as a wedge bearing directly on the housing frame, B", in such a manner that if moved forward it will be brought down, as specified.

Second, The cam, R, when used in combination with the head piece, M, housing frame, B", shaft, O, and pulley, T, for the double purpose of holding the head piece, M, down and to raise it alternately.

Third, The side pieces, K K", when having their outside edges formed as inclined planes bearing directly on corresponding inclined planes in the housing frame, B", and having projecting lugs, k k, for the purpose specified.

Fourth, The block, G, when having parallel notches, in combination with the frame, F, having notches of corresponding shape and size.

Fifth, The T-shaped table, Z, and the sliding head, Z", when used in combination with the press, as described, and for no other purpose than the one specified and claimed.

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50,449.—Device for Attaching Handles to Whitewash Brushes.—W. B. Burtnett, New York City, and James P. McIntosh, Highland Mills, N. Y.:

We claim, First, The combination of a pivoted adjustable strap, b, which is adapted for receiving the brush handle, with a brush stock, substantially as described.

Second, The combination of an adjustable strap, b, having an adjustable handle applied to it, with a brush stock, substantially as described.

50,450.—Machine for Putting Up Fleeces of Wool.—Samuel G. Chase, Raymertown, N. Y.:

I claim a receiver or box constructed of vertical bars affixed to a platform, and so arranged in reference to each other as to form or leave clear open spaces between them, within which is adjusted the cords used in putting up fleeces of wool, constructed and arranged substantially in the manner as herein described, and for the purpose as set forth.

Also, In combination with said receiver or box, I claim a follower, F, provided with slots, a a a, at its edges, by means of which, in addition to its conjoint operation with the box aforesaid in compressing the fleece of wool, it also serves to hold the bars forming said box in proper vertical position during the act of compression, constructed and operating in the manner substantially and for the purpose as herein described.

50,451.—Sewing Machine.—John Chilcott, Brooklyn, N. Y. Antedated Oct. 4, 1865:

First, I claim the attachment to the presser foot of a sewing machine of a furrowing piece, F, which, without cutting, will produce by pressure in that surface of the leather or other material to be sewed which passes in contact with said foot, and immediately in front of the stitches being made, a furrow or continuous indentation for the reception of the exposed portions of the stitches on that surface, substantially as herein described.

Second, The attachment to the needle die, needle plate or work plate of a sewing machine of a furrowing piece, G, which, without cutting, will produce by pressure in that surface of the leather or other material to be sewed which passes in contact with said die or plate, and immediately in advance of the stitches, being made a furrow or continuous indentation for the reception of the exposed portions of the stitches on that surface, substantially as herein described.

Third, The combination of the furrowing pieces, F G, applied as described to operate by pressure on opposite sides of the leather or other material to be sewed, substantially as and for the purpose herein specified.

Fourth, Making the furrowing piece, G, which is attached to the needle die or needle plate of the sewing machine adjustable relatively to the said die or plate by a set screw or its equivalent, substantially as and for the purpose herein specified.

50,452.—Automatic Dancer.—Charles Chinnock, Brooklyn, N. Y. Antedated Oct. 4, 1865:

I claim the attachment of the figure to the pillar, B, by means of a bent lever, C, and an adjustable balancing spring, d, substantially as herein specified.

50,453.—Cultivator.—Daniel Churchill and S. C. Brewer, Ionia, Ill.:

We claim the combination and arrangement of the draft rods, G, the bar, F, clevis, a, and slotted pendant, H, as and for the purpose set forth.

Second, The combination of the plow beam, E, clevis, a, and slotted pendant, H, when arranged to operate as shown and described.

50,454.—Washing Machine.—Arnold B. Clark, Delevan, Wis.:

I claim the frame, B, in which the shaft, C, and concave of rollers, d, are placed, when said frame is used in connection with eccentrics, J, applied and arranged substantially as shown, for raising and lowering the rubber and concave, as set forth.

50,455.—Saw-mill.—Gilbert H. Clemens, Cincinnati, Ohio:

First, I claim the rotary shifting knee, G, having lips, I I', and intervals, J J', in combination with the circular dovetail boss, D, on the base plate, B.

Second, The construction of a saw-mill knee with a receding concave face, L, having one or more friction rollers, O".

50,456.—Odometer.—H. R. Coburn, Lowell, Mass.:

I claim rendering the space passed over by the pawl carrier lever, O, adjustable, substantially as set forth and for the purpose described.

50,457.—Breast Pump.—L. O. Colvin, Philadelphia, Pa.:

I claim the milk receptacle, A, cup, B, and nipple tube, C, in combination with the valves, D E, all constructed, arranged and combined to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved breast pump, and it consists in the employment or use of a bulb or milk receptacle, valve cup, and valve and nipple tube, all arranged and combined in such a manner as to form an extremely portable and convenient breast pump—one which may be operated with the greatest ease by the person requiring its use, and with equal facility when applied to either breast.]

50,458.—Rolling Car Axles.—Thomas Cooper, Cincinnati, Ohio:

I claim, First, The combination of the two eccentric rollers, D D, and rests, K K, arranged to operate substantially as and for the purposes set forth.

Second, The sliding or adjustable rollers, E, placed on the same shafts, c, as the rollers, D, and controlled by springs, I, substantially as and for the purpose set forth.

50,459.—Feed-water Heater.—Wm. B. Cross, Sacramento City, Cal.:

I claim the chambered head, B, with nozzles, f, in combination with the tubes, b, and box or case, A, constructed and operating substantially as and for the purpose described.

[The apparatus which forms the subject matter of this invention is composed of a series of small pipes, projecting from the interior of a chambered head into the water pipes, in combination with a supply and discharge pipe, in such a manner that by opening said supply and discharge pipes a current of hot water from the boiler is injected in each of the water pipes of the apparatus, and by the action of the water all the sediment which may have collected in said pipes is readily blown out, and the apparatus is cleaned in a short time, and without interrupting the operation of the engine.]

50,460.—Music Stand.—Jacob David, Brooklyn, N. Y.:

I claim a folding music stand, constructed substantially as above shown.

50,461.—Dental Apparatus.—Wm. H. Diddle, Bordentown, N. J.:

I claim, First, The apparatus above shown, for the use of dentists in filling and operating on the teeth, whereby the tongue and cheek are held off from the teeth, the mouth is kept open by giving artificial support to the upper jaw, and liquid is drawn from the mouth without interfering with the operations of the dentist, by means of a pump substantially as shown.

Second, I claim the combination of the basin, G, and tube, U, with the tongue holder, I, constructed substantially as herein set forth.

Third, I also claim the combination of the tube, A, and basin, G, with a pump, substantially as shown.

Fourth, I also claim protecting the end of the tube from the mucus membrane, and protecting the interior of the basin from the tongue by the cage, H, substantially as shown.

Fifth, I also claim the bow, S, for holding the cheek away from the teeth, substantially as shown.

50,462.—Sewed Shoe.—Henry Dunham, Jr., Abingdon, Mass.:

I claim, as an article of manufacture, a sewed shoe, with the vamp, or upper, and sole united, by machine, by chain stitches passing through the vamp and the inner surface of the sole—not passing entirely through its bottom—the said stitching being on a turned shoe on the inside, and entirely concealed when the article is finished, and on a welted shoe being also concealed, being covered, by another sole.

50,463.—Saw Sets.—A. R. Fenner, Cold Brook, N. Y.:

I claim the two handle bars, A B, pivoted together, and provided with, the two jaws, d e, as shown, in connection with the screws, E D, one or both, and gage plate, F, all constructed, arranged and operating in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved saw-set, and it consists in the employment or use of the jaws, gage screws and a gage, all arranged in such a manner as to admit of the saw being set in a true or even manner, regardless of the variation in the thickness of the saw plate.]

50,464.—Washing Machine.—J. V. Ghormley, Bellefontaine, Ohio:

I claim the combination of the slotted cylinders, B and C, and hook, d, constructed and arranged substantially as and for the purpose herein described.

50,465.—Sieve.—S. V. Gifford, Hudson, N. Y.:

I claim, First, The conical rollers, M M, provided with the blades or cutters, a*, in connection with the sieve, G, the rollers being arranged so as to operate with a rotary motion on an axis, and also to revolve upon the sieve, substantially as set forth.

Second, The combined vessel, A, and scoop, C, when used in connection with the pressure rollers, as and for the purpose specified.

Third, The attaching of the sieve, G, to the bottom of the vessel, A, through the medium of a rim, F, applied to the vessel, and having the wheel, H, attached to it, substantially as and for the purpose set forth.

Fourth, The combination of the conical pressure rollers, M M, vessel, A, scoop, C, and sieve, G, all arranged substantially as and for the purpose specified.

50,466.—Bolts for Flouring Mills.—Solomon Godfrey, Peoria, Ill.:

I claim the tube, A, constructed with a concave wire gauze front, arranged and operating substantially as described, in combination with the bolt, B, for the purposes set forth.

50,467.—Machine for Crushing Ore.—A. W. Hall, New York City. Antedated Oct. 1, 1855:

I claim inclosing the crushing wheels of a machine for crushing and pulverizing ore or other materials, by an air-tight cover, so combined with the pan in which the said wheels work as to form therewith an air-tight chamber, in which the crushed or pulverized material is subjected to the action of a blast or blasts of air, substantially as herein specified.

50,468.—Dentist's Mallet.—J. A. Harris, Pontiac, Mich.:

I claim a dentist's mallet, composed of a guard, A, hinged spring mallet, D, and trigger, H, connecting with the mallet by a cat-gut and lever, or any other equivalent means, substantially as and for the purpose set forth.

[This invention relates to a dentist's mallet, composed of a guard to encircle the hand of the operator, and provided with a standard, to which the mallet is hinged, in combination with a trigger, connecting with the mallet by a suitable lever and cord, in such a manner that the instrument can be conveniently held by the thumb and the first two fingers, and by a pressure of the last two fingers on the trigger the mallet can be brought down with the greatest precision, and with any desired amount of power, thereby enabling the operator while plugging teeth to dispense with the help of an assistant.]

50,469.—Sewing Machine.—Wm. Hart, Sand Lake, N. Y.:

I claim the application to the shafts or spindles of the lower needles or hooks of sewing machines of adjustable bushes, constructed and applied substantially as described and shown.

[The object of this invention is to improve that class of sewing machines in which a rotating hook or needle is used, and it consists in placing a bushing loosely about the shaft of such hook or needle, so as to relieve the shaft and preserve it from wear, the bushing being so made that any decrease in the diameter of the shaft and any enlargement of the bushing can be compensated by compressing the bushing.]

50,470.—Fountain Pen.—George F. Hawkes, New York City:

I claim, First, The arrangement of a ring or other equivalent support on a stopper of a fountain pen to keep it central in its seat, thereby doing away with one cause of leakage, and increasing the security of the hold on the pen.

Second, The slot or slots employed for keeping the feeder in a line of motion, and used at the same time as the openings for the ink to pass out when the feeder is drawn out, substantially as described.

Third, A stopper, operating in conjunction with a feeder, substantially as described.

50,471.—Spring for Furniture.—David Hawkins, Derby Conn.:

I claim a spring, for upholstering or other purposes, constructed in the manner substantially as herein described.

50,472.—Railway Car.—S. C. Hawkins, Patchogue, N. Y.:

I claim, in combination with the ordinary wheels of a railway car, the use of one or more sets or series of supplementary or oblique wheels, hung and turning in suitable swinging arms or frames, arranged with regard to the rails, and operating substantially in the manner described and for the purposes specified.

[This invention consists in using in connection with the ordinary wheels of a railroad car, a series of one or more inclined or oblique wheels, arranged and connected either with the truck or frame of the car, and to bear upon or against the inner edges of the rails, whereby the flanges of the upright wheels are prevented from coming in contact with the sides of the rails, thus relieving not only the rails but also the wheel flanges from a great deal of wear.]

50,473.—Box-plaiting Attachment for Sewing Machines.—Ansel Hecht, New York City:

First, I claim the upper and lower plaiter, Q and U, operating substantially as described and for the purposes herein set forth.

Second, I claim the mouth plaiter, S, acting in connection with the lower and upper plaiter, Q and U, as and for the purpose described.

Third, I claim the lever, F, operating as described, in combination with the upper and lower plaiters.

Fourth, I claim the metallic springs, Z Z, Fig. 3, or plates, m m, Fig. 1, expressly for the uses and purposes set forth.

Fifth, I claim the guide, g, in connection with the mouth plaiter, S, as and for the purposes described.

Sixth, I claim the cog wheels, D E F G, arranged and proportioned to operate with the lower, upper and mouth plaiters, Q U S, so that every double fold may obtain four stitches, substantially as described and set forth herein.

50,474.—Manufacture of Iron and Steel.—James Henderson, Brooklyn, N. Y.:

I claim mixing manganese, or the equivalent thereof, with the ore or ores charged in the blast furnace for smelting, in combination with, and to produce, crude molten iron to be directly converted by the pneumatic process, substantially as and for the purpose specified.

50,475.—Combination in Ruling and Printing Machines.—H. J. Hewitt, Brooklyn, N. Y.:

I claim the combination of cylinder, C, conductor, D, movable bed, F, and pen plate, H, or their several equivalents, constructed and operating together, substantially as and for the purposes set forth.

50,476.—Instrument for Lifting Jars and Cans.—J. E. Higby, West Meriden, Conn.:

I claim a new improved article of manufacture, a jar lifter, the handles or arms, e, clasps, o, or their equivalents, adapted for lifting cans or jars, substantially as described.

50,477.—Journal Box.—Thomas Hill, St. Louis, Mo.:

I claim the wedge-shaped box, a, with one or more screws, d, in combination with the connecting rod, A, and strap, B, constructed and operating substantially as and for the purpose set forth.

[This invention consists in the use of a wedge-shaped box or cad in combination with one or two screws passing through the strap end, and bearing on the box in such a manner that by turning the screw the wedge-shaped box is turned and drawn up tight against the journal; or, when two screws are used, by turning one screw the box is tightened, and by turning the other it is held in position and protected from coming back spontaneously, and the labor of constructing the box is naturally reduced.]

50,478.—Harrow.—C. Jillson, Worcester, Mass.:

I claim, First, The combination of a harrow, arranged for reciprocating action transversely to the path of the machine of a harrow frame, connected as described, with the axle of the driving wheels, by means of swinging arms, substantially as set forth.

Second, The combination with the harrow, I, and harrow frame, D, of the arm, o, and stop or plate, e, substantially as set forth.

50,479.—Awning.—E. E. Laumont, New York City:

I claim the roller, a, operated by the crank, c, in combination with the hinged frame, b, and awning, A, constructed and operating substantially as and for the purpose set forth.

[This invention relates to an awning, the outer end of which is secured to two hinged rods, whence its inner end is fastened to a roller, to which a recoiling motion can be imparted by a crank on the inside of the window, said crank being made to connect with the roller by an upright shaft, and suitable bevel gear, in such a manner that by the action of the hinged rod the awning is drawn out and held in the desired position as soon as the same is unrolled from the roller, and by turning the crank it can be taken in partially or wholly at any moment, without raising the window, and without trouble.]

50,480.—Bit Stock.—C. E. Lombard, Springfield, Mass.:

I claim the combination of the piece, B, collar, D, pin, d, and spring, C, with a bit stock and bit, when arranged in the manner and for the purpose herein set forth.

50,481.—Machine for Cutting Sheet Metal.—Hosea Low, Waukon, Iowa:

I claim, First, The use of two pairs of shears, adjustable for any desired bevel and length, in combination with a treadle or other equivalent device, constructed and operating substantially as and for the purpose set forth.

Second, The use of the adjustable and reversible gages, F, in combination with the shears, C, all constructed and operating substantially as and for the purpose described.

Third, The application of crooks, f, to the cutting edges of the shears, substantially as and for the purpose specified.

50,482.—Clothes Wringer.—David Lyman, Middlefield, Conn.:

I claim the spring, F, slot, a, and stop, a', adapted to control the position of the shaft, e, and wheel, E, when arranged relatively to the chain, D, and rolls, B and C, of a clothes wringer, substantially as and for the purpose herein set forth.

50,483.—Fixing for Puddling Furnace.—Hugh McDonald, Pittsburgh, Pa.:

I claim the use of iron ore in its raw or unmelted state, previously ground fine, and mixed with a thick paste or dough, with water, as a fixing for puddling or boiling furnaces, and used in the manner substantially as hereinbefore described.

50,484.—Carpenter's Gage.—George Miller, Washington, D. C.:

I claim the arrangement of the stock, A, plates, B B, removable slide, C, and the central and shifting points, g g', in the stock and slide respectively, and with or without the point, E, and pencil, p, substantially as described and represented.

50,485.—Substitute for Lining Paper.—George Munger, New Haven, Conn. Antedated Oct. 4, 1865:

I claim, as new and useful, the within described substitute for lining paper, etc., as a new article of manufacture.

50,486.—Fruit Basket.—George Munger, New Haven, Conn. Antedated Oct. 13, 1865:

I claim the herein-described fruit basket, when constructed from one piece of veneer, stitched as described, either with or without a cover, as specified.

50,487.—Boot and Shoe.—J. L. Newton, Boston, Mass.:

I claim a boot or shoe, the lacing strips or supports of which are made of untanned hide or skin, as and for the purpose above set forth.

50,488.—Base for Piano-forte Stools.—Francis Odell, New York City:

I claim the new and useful manufacture of metal bases for piano-forte stools, made in imitation of, and substitution for, ornamental wood bases ordinarily used for such purposes.

50,489.—Machine for Necking Cartridge Cases.—Brigham Payne, South Coventry, Conn.:

I claim the combination of the fixed or stationary shaft with the hollow arbor or wedging die, operating together substantially in the manner and for the purpose specified.

[This invention relates to a machine for necking cartridge cases, which consists in a novel arrangement of a swedging or necking die, to which and at the proper times the cartridge cases are fed and operated upon by it.]

50,490.—Weather Strip.—A. M. Peniston, Avon, Ill.:

I claim the construction, arrangement and combination of the flat strip, b e, sill strip, G e, and enlarged recesses, I f, all in the manner hereindescribed and shown, and for the purpose set forth.

50,491.—Apparatus for Carbureting Air.—Erasmus Allington Pond, Rutland, Vt.:

I claim the method herein described of charging atmospheric air with the vapor of hydro-carbon fluids by the discharging the air through contracted openings into the mass of fluid, substantially as herein shown and described.

Second, The method herein described of charging atmospheric air with the vapor of hydro-carbon fluids, by dividing the column of air and discharging the same into the liquid in small streams, substantially as herein before described and shown.

50,492.—Inserting Glass in Umbrellas, Etc.—E. A. Pond and M. S. Richardson, Rutland, Vt.:

We claim the method of inserting glass or other transparent plate in flexible or limber fabrics or materials, substantially as and for the purposes set forth.

Second, As a new article of manufacture, we claim umbrellas provided with windows made of glass or other transparent plate, substantially as herein shown and set forth.

50,493.—Manufacture of Lampblack.—Augustus Prenatt, Elizabeth, N. J.:

I claim, First, In flues for making lampblack, surrounding them by water, space, substantially as and for the purpose above described.

Second, I also claim in the manufacture of lampblack, supplying the fuel to the flues, from beneath, substantially as above described.

[This invention relates to the process of manufacturing lampblack and consists partly in surrounding the fire chamber of the flue with a water jacket, and partly in a mode of supplying fuel to the furnace.]

50,494.—Lard Press.—Joseph Rayner, Piqua, Ohio:

I claim the arrangement of the outer and inner perforated cylinder, and the convex bottom with the tubular slanked concave faced follower, operated as described.

[This invention principally consists in forming the bottom plate of the press of a convex shape, in connection with the use of a follower having its underside, between which and the convex bottom the lard scraps are compressed of a concave shape, corresponding to the convexity of the bottom, whereby great strength is imparted to both, with the use of but a small amount of metal, and the lard scraps are also prevented from spreading as the follower descend and presses upon them.]

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50,495.—Preparation and Manufacture of Dyes and Colors.—George H. Reid, Boston, Mass.:

First, I claim as a new manufacture or composition of matter, and as a new article of commerce, liquid dyes, produced from vegetable or mineral coloring matters, so mixed and prepared with the proper proportion or quantity of highly concentrated mordant that the same will endure both heat and cold, and may be kept for any period, without undergoing change, and will produce a complete and effectua ldye upon either silk or woolen cloth or fabric at one application.

Second, I claim the process of making liquid dyes, in all colors, by the mixture and preparption of coloring matters and highly concentrated mordants, either of vegetable or mineral origin or both, in such manner that the dyes will endure both heat and cold, and may be kept for any period, without undergoing change, and will produce a complete and effectual dye upon either silk or woolen cloth or fabric, at one application, in the manner substantially as above set forth.

50,496.—Governor for Steam Engines.—James M. Rees, Scott, Ohio:

I claim the adjustable rod, d, in combination with the lever, E, arm, e, valve, f, and piston, B, substantially as and for the purpose described.

50,497.—Bolt Cutter.—George A. Reis, Belvidere, N. J.:

I claim in the connecting the link, m, to the bolt cutter as aforedescribed with the grooves in the ends of E, and the handle, A, respectively and substantially as figured in Figs. 3 and 4.

50,498.—Apparatus for Preserving and Exhibiting Photographic Pictures.—Charles Robinson, Springfield, Mass.:

I claim the guide plates, D D, in combination with the mounting band, C, and winding cylinder, B B, substantially as and for the purpose herein specified.

50,499.—Bathing Apparatus.—Carl Schultz and Thomas Warker, New York City. Antedated Oct. 4, 1865:

We claim, First, The combination with a bathing tub of a fountain containing carbonic acid, water or other gaseous liquid, substantially as and for the purpose set forth,

Second, The use of a small pipe, D, with little holes in combination with the tub, A, and fountain, B, applied and operating substantially as and for the purpose described.

Third, The perforated false bottom, E, in combination with the tub A, fountain, B, and pipe, C, constructed and operating substantially as and for the purpose specified.

50,500.—Gaseous Liquid Injector.—Carl Schultz and Thomas Warker, New York City. Antedated Oct. 4, 1865:

We claim combining with a fountain containing carbonic acid, water or other gaseous liquid, a heater composed of a coil of pipe situated in a vessel fitted with hot water, or constructed in any other suitable manner, substantially as herein set forth, so that a hot injection of such gaseous liquid can be obtained without allowing the escape of gas.

Also the application of a bulb, g, in combination with the coil, c, vessel, d, fountain A, and tip, f, constructed and operating substantially as and for the purpose described.

50,501.—Hand Stamp and Canceler.—Jerome B. Secor, Chicago, Ill.:

I claim combining with a stamp head, a series of wheels that can be turned, and locked when turned, by a corresponding series of thumb nuts and levers, arranged to operate substantially in the manner and for the purpose herein described and represented.

50,502.—Rifling Ordnance.—John Seipel, Washington' D. C., assignor to Cassius M. Clay, Kentucky:

I claim the combination of the narrow spiral ridges, A, and the intervening broad entering spaces, B, the space back of the ridges forming a chamber for the ball, which is introduced in the manner described.

50,503.—Fire-kindling Composition.—Joseph Smith, Providence, R. I.:

I claim a kindling compound made of the ingredients herein described and mixed together, substantially as set forth.

50,504.—Wood and Paper Boxes.—David M. Smyth, New York City:

I claim, First, A stationary block or form, in combination with a roller that travels around such block, and bends the strip of material to form the box or lid, and holds the ends together where they lap, as specified.

Second, In combination with the block and roller as aforesaid, I claim the treadle and weight, acting in the manner specified.

Third, I claim the revolving table or arms, carrying a series of forming blocks and rollers, actuated as and for the purposes specified.

50,505.—Horse Collar.—Albert A. Stannard, Ithaca, N. Y.:

I claim laying the two edges of the leather composing the rim of the collar, and the two edges of the leather composing the cushion or pad of the collar, one above the other, and the sewing of them together so that the stitching shall show in one of the recesses only of the collar, in the manner and for the purposes described.

50,506.—Hot-air Engine.—Collins Stevens, Boston, Mass.:

I claim, First, Introducing cold air between two or more connected pistons or surfaces, so arranged that while between such surfaces it shall not materially increase in bulk, and heating it after it has been introduced and while confined between such pistons or surfaces; and after the air so confined has been heated, using the expansive force thereof, for producing power by means and devices substantially as described.

Second, Arranging the said pistons or surfaces, so that the pressure of the heated confined air in opposite directions shall be balanced and neutralized, substantially as described.

Third, The combination of the three cylinders and pistons, A A', C C', D D', and H H', or their equivalents, substantially as described for the purposes set forth.

Fourth, The arrangement of the furnaces between the cylinders, A A', and C C', or D D', substantially as described, for heating the air.

Fifth, Using soft unction substances, suostantially as described, for lubricating the pistons.

Sixth, The arrangement of the valves or stop cocks as d d' d'', for the purpose of cutting off one of the furnaces so that fuel may be supplied without stopping the engine, substantially as described.

Seventh, The arrangement of valves operating substantially as the valves, t t' t'', in u, and u', respectively, for the purpose of opening and closing the pipes between said cylinders, and allowing the exit and escape of the hot air, substantially as described.

Eighth, The arrangement of valves, as s s', for preventing a partial vacuum when the air is not sufficiently heated to fill the working cylinder or its equivalent.

50,507.—Breech-loading Fire-arm.—James Stillman, Sprinfield, Mass.:

I claim, First, The combination of a solid recoil block, E, which turns back exposing the rear end of the bore for the insertion of the cartridge with a separate locking piece or brace, G, having its bearing, O, constructed as described and swinging on a separate center from any other part of the gun, these parts being combined with and operated by the springs, g, and e, and thumb pieces, a, and W, in the manner and for the purpose herein set forth.

Second, Arranging the brace, G, so as to half cock the gun by means of its thumb piece, and with the same motion which allows the breech piece, E, to swing back and expose the rear end of the bore, substantially as described.

50,508.—Brick and Tile Machine.—B. F. St. John and Henry Horst, Shelbyeville, Ind.:

We claim the endless conveying and discharging platform, C, in connection with the holding or retaining roller, D, the hopper, F, and the pressure roller, G, both with and without the ring or band, K, substantially as and for the purpose herein set forth.

50,509.—Lamp Shade.—Cornelius St. John, Boston, Mass.:

I claim the improved folding lamp shade, made substantially as described, viz, of the folding body, A, and the supporting annulus, B, and tube, C, and tube, c, and its projections, or the equivalents thereof, applied to one end of such body in manner and so as not only to support the body on a lamp chimney, but to enable it be expanded while thereon, substantially as set forth.

I also claim in combination with the folding lamp shade so made, the expander, D, constructed substantially as, and to be used as specified.

50,510.—Stand for Latches.—H. D. Stover, New York City:

The combination of the hollow frame, A, with the revolving tool holder, G, and the door, J, the whole being constructed and arranged substantially as for the purpose set forth.

50,511.—Expanding Metals by Steam Heat.—Allen S. Sweet, Jr., Detroit, Mich.:

I claim the formation of temporary steam channels, cavities, or chambers on the surface of such part or parts of machines to be heated and expanded, by attaching thereon belts, casings or plates, C1 C2, or other equivalent devices, when constructed, applied, and operated substantially in the manner and for the purposes herein specified.

50,512.—Ice Creeper.—Thomas Symonds, Portland, Maine:

I claim the combination of the sliding frame, A, the grooves, e e, the slides, c c, the button, B, and the bar, D, all as and for the purpose described.

50,513.—Manufacture of Collars, Cuffs, Etc.—Alfred Taylor, Philadelphia, Pa.:

I claim a collar cuff or shirt bosom, consisting of textile fabric, coated with selicate of soda, containing oxide of zinc or its equivalent, as set forth.

50,514.—Removing Paper Collars, Cards, Etc., from the Printing or Embossing Press.—Temple Tebbetts, New York City:

First, I claim the traveling projecting lever, a, with its appendages, in combination with the spring stud, i, or its equivalent, operating substantially as described for the purpose specified.

Second, I claim the combination of the catch, d, and knuckle, e, with the spring stud, i, for the purpose as herein set forth.

Third, I claim the guardboard, h, in combination with a projecting lever, a, or its equivalent, and in combination with this the opening in the table, c, for the purpose as herein fully described.

50,515.—Burner for Gas Stoves.—Wm. A. Thompson, Brooklyn, N. Y.:

I claim in etnas or burners for gas stoves, the annular and shielded opening, E, arranged relatively to the other parts, substantially in the manner and for the purposes herein set forth.

50,516.—Horse-hay Fork.—Henry Totten, Leesville, Ohio:

First, I claim the tines, A, constructed substantially as described, so that the parts, a b, and c, shall lie in planes of different angles

Second, The construction and arrangement of the bar, B, standard, C, quadrant brace, D D' and swivel bar, F, substantially as described.

Third, The construction and arrangement of the quadrant brace, D D' swivel bar, F, hook G, and dog, H, operating substantially as described.

50,517.—Car Brake.—Henry H. Trenor, New York City:

I claim operating the brakes of railroad carriages, by means of eccentrics, substantially as herein described, whereby simultaneous action of the brakes may be effected on the wheels on either or all of the cars of a train, said brakes acting so that each wheel shall receive pressure on opposite sides of its periphery.

50,518.—Running Gear of Railroad Cars.—Henry H. Trenor, New York City:

In combination with the movable trucks of railroad cars, of otherwise ordinary or suitable construction, I claim the directing connecting links, substantially as and for the purpose herein set forth.

I also claim the method of coupling the cars or vehicles of a train of two or more cars or vehicles, by means of connecting links attached to the pivots or king bolts of the track, substantially as herein shown and set forth.

50,519.—Cook Stove.—John Van, Cincinnati, Ohio:

I claim, First, The mode of fastening the exterior plates of a stove by means of the pockets, F, lips, G G', locking strips, H, and screws, I, or devices, substantially equivalent.

Second, The detachable dovetailed hinge socket, K, for the upper pivot of a stove door

50,520.—Mode of Lubricating Journals.—Wm. Van Anden, Poughkeepsie, N. Y.:

First, I claim an oil chamber and hollow stem, forming a part of the upper half of a journal box when used with a ground-wheel machine, in a manner and for the purpose substantially as described.

Second, I claim in combination with the devices mentioned in first claim, the cap or stopper, B, used in a manner for the purpose substantially as described.

Third, I also claim the shank drop valve in combination with the chamber and hollow stem, for the purpose substantially as described.

50,521.—Photographic Album.—Richard Van Velthoven and Joseph H. Hazzard, Philadelphia, Pa.:

We claim the strips, C C', of any suitable material formed substantially as herein described, and combined with the levers of an album or other book, substantially as and for the purposes set forth.

50,522.—Ventilation for Railroad Cars.—A. P. Vining, Scranton, Pa. Antedated Oct. 11, 1865:

I claim the double valve, D, composed of two obliquely connected wings, g g', pivoted centrally at f, and employed in combination with an external casing, A, of the construction specified.

50,523.—Method of Decolorizing Malt Liquors.—Charles R. M. Wall, Brooklyn, N. Y.:

I claim exposing wort or other liquid to be decolorized, while in a state of ebullition, to the rays of the sun or of a suitable artificial light, substantially as set forth.

[This invention consists in throwing on the surface of the liquid during the boiling process the rays of the solar light or those of a calcium or other artificial light, either direct on by reflection, in such a manner that by the action of such light the liquid is bleached, and the wort can be perfectly boiled without danger that the same will be colored any darker than desirable.]

50,524.—Corset Clasp.—Robert Wallace, De Grasse Fowler and Herbert E. Fowler, Wallingford, Conn.:

First, We claim the method herein described of making corset clasps, by longitudinally corrugating the steel at both ends, in the manner and for the purpose set forth.

Second, As a new article of manufacture, we claim corset clasps or steels in which a longitudinal central bead is raised at the end of the steels, or such parts thereof which require greater strength and rigidity, substantially as herein shown and described.

50,525.—Horse Rake.—C. W. Warner and H. N. Tracy, Williston, Vt.:

We claim the combination of the socket, A, having two sets of shoulders, a a a' a', the sliding bar, F, and the pawl, H, all arranged to operate as described.

We further claim the attaching of the pawl, H, to the strap, B, in the manner shown, or in any equivalent way, to render said pawl adjustable.

We also claim the screw, b, or its equivalent, in the bar, E, for the purpose of adjusting the latter, substantially as set forth.

[This invention consists in an improvement on the means employed for operating the rake so that it may discharge its load, whereby several advantages are obtained over the device for that purpose originally used.]

50,526.—Apparatus for Making Vinegar.—Christopher Wesener, Cincinnati, Ohio:

I claim the manner of constructing a self-acting acidifier, and its principle of action by capillary attraction.

50,527.—Slide Valve.—Stephen D. White, Centralia, Ill.:

I claim the arrangement within the steam chest, A, of the parts C and D, of the valve, the follower, E, springs, h, packing rings, e, operating as described.

50,528.—Rolling Pin.—George L. Witsil, Philadelphia, Pa.:

I claim a rolling pin which is constructed hollow and of two longitudinal semi-cylindrical sections, in combination with a fastening for securing these sections together, substantially as described.

50,529.—Harvester Rake.—Jerome Bacon, Medina, Wis., assignor to himself and John F. Seiberling, Doylestown, Ohio:

First, I claim the use of a rake on the rear of a harvesting machine for removing the gravel after it has fallen from the platform of the machine upon the ground, for the purpose of clearing a track for the next turn of the team, substantially as described.

Second, I claim the employment of the rake, D, in combination with the tilting platform, M, substantially as set forth.

Third, I claim the combination of the rake, D, the supporting rod, A, the elbow lever, F, and the hand lever, G, substantially as described.

50,530.—Bench Plane.—Lyman C. Bliss (assignor to Lyman C. Bliss and John Griffith), Richmond, Ind.:

I claim as an article of manufacture a bench plane constructed as described, with a jointing bit and a draw cut splint-cutting bit on the opposite sides of the dividing strip on the face of the plane.

50,531.—Wringing Machine.—John O. Couch (assignor to the Metropolitan Washing Machine Company), Middlefield, Conn.:

I claim the double ended crown coupling, E e, in combination with the lobed or toothed part, D d, on the shaft, c, and the corresponding part, D' d, on the shaft, c', and with the yielding roll, C, of a clothes-wringing machine, all arranged and adapted to operate substantially in the manner and for the purposes herein set forth.

50,532.—Blind Fastener.—G. K. Dearborn (assignor to himself and C. M. Bromwick), South Boston, Mass.:

I claim the combination of the catch plate, n, and the lever, r, or their equivalents, arranged together and operating substantially in the manner and for the purpose specified.

50,533.—Apparatus for Treating Ores.—Halvor Halvorson, North Cambridge, Mass., assignor to himself and William Tracy Eustis, Boston, Mass., assignors to themselves and L. L. Cushing, Jr., Cambridge, Mass.:

I claim the machine constructed and susceptible of being operated substantially as and for the purposes set forth.

50,534.—Amalgamator.—Halvor Halvorson, North Cambridge, Mass., assignor to himself and William Tracy Eustis, Boston, Mass., assignors to themselves and Levi L. Cushing, Jr., Cambridge, Mass.:

I claim, First, The ring, h, for the purposes herein recited.

Second, The elastic roller, i, either alone or in combination with the dasher, j, as described.

Third, The recess, k, for the purpose herein set forth.

Fourth, In a rotating tub or pan, I claim the amalgamated copper lining, for the purpose set forth.

Fifth, I claim the arrangement of the shield, a, in relation to the shaft and the gearing, as described.

Sixth, I claim the arrangement of the apertures, l and m, and valve, n, with the hollow shaft, as described.

50,535.—Explosive Shell.—J. H. Hiscock, Turner, Me., assignor to himself, E. A. Nickels and Granville C. Shaw, Washington, D. C.:

I claim the use of the interlocking, symmetrical and uniform-shaped blocks or segments, A, in the outer wall of a shell for ordnance.

50,536.—Metallic Cartridge.—T. J. Powers (assignor to J. P. Fitch, E. E. Chamberlin and J. R. Van Vechton), New York City:

I claim a shot cartridge, formed of the powder case, Fig. 1, and the shot case, Fig. 3, the same being constructed, charged and combined, substantially as described.

50,537.—Platform Scales.—Elnathan Sampson, Lansingburgh, N. Y., assignor to Alfred Clarke Hitchcock, Green Island, N. Y.:

I claim, First, The arrangement and combination of the horizontal, parallel levers, D, with the bell crank or T-shaped lever, E, in the manner and for the purposes substantially as herein described and set forth.

Second, I claim the employment of the bell crank or T-shaped levers, E, constructed and combined with the center-connecting rod, G and G', in the manner and for the purposes substantially as herein described and set forth.

Third, I claim the employment of the center-connecting rods, G and G', in combination with the bell-crank lever, H, in the manner and for the purposes substantially as herein described and set forth.

50,538.—Machinery for Manufacturing Lanterns.—Wm. Westlake (assignor to himself, J. E. Cross and J. F. Dane), Chicago, Ill.:

I claim, First, The block, A A, when made in the form and for the purpose as described.

Second, The spacer, d d, when made as described.

Third, The combination of the spacer, d d, and the block, A A, in the manner described.

50,539.—Clenching and Nipping Tool.—D. A. Wilson (assignor to himself and C. P. Higbee), Cambridge, Vt.:

I claim the improvement in a clinching and nipping tool, herein described, the same consisting in the use of the adjustable arm or projection, f, for the purpose specified.

[This invention relates to a clinching and nipping tool invented and patented by E. Warren, of Marshall, Wisconsin, on the 3d day of November, 1863, and consists in a combination of an adjustable clinching tool and nipper, so constructed and arranged that the horseshoe nails may, when a shoe is applied, be clinched on the hoof of the horse without the aid of a hammer, and old nails readily withdrawn from the hoof in detaching a shoe therefrom.]

50,540.—Machine for Weighing Grain.—Elnathan Sampson, Lansingburgh, N. Y., assignor to Alfred Clarke Hitchcock, Green Island, N. Y.:

I claim, First, The arrangement and combination of the means herein described and set forth, by which grain may be weighed in large quantities continuously, and without other aid than that which will supply grain to the machine, start its operation, and continue the same, in the manner substantially as herein described and set forth.

Second, I claim the employment of the circular or rolling weight, M, in combination with the vibrating scale beam, L, in the manner and for the purpose substantially as herein described and set forth.

Third, I claim the employment of the oblique levers, Q, in combination with the horizontal trip levers, S, and with the circular or rolling weight, M, in the manner and for the purposes substantially as herein described and set forth.

Fourth, I claim the employment and combination of the trip levers, S, with the scale beam, L, and with the oblique levers, Q, in the manner and for the purposes substantially as herein described and set forth.

Fifth, I claim the employment of the gates or valves, T, arranged and combined so as to check and stop the supply of grain to the weighing receiver or hopper, G, from the tube, V, in the manner and for the purposes substantially as herein described and set forth.

Sixth, I claim the arrangement of the gate or valve, H, or its equivalent, at or near the bottom of said weighing receiver or hopper, G, in combination with the horizontal bar, I, each operating in the manner and by the means and for the purposes substantially as herein described and set forth.

Seventh, I claim the employment of the means herein described and set forth, for opening and closing the gates or valves, T, in the manner substantially as herein described and set forth.

Eighth, I claim the employment of a scale beam, having thereon arranged and combined the inclined plane, m, and guides to direct the movement of the circular weight, M, in the manner substantially as herein described and set forth.

50,541.—Stuffing Box for Steam Engines.—Victor Duterne, Paris, France:

I claim the combination with the piston rod, b, and stuffing box, f, of the conical sleeves, a and c, spring, d, piece, e, and cap, g, substantially in the manner and for the purposes specified.

50,542.—Anchor.—Charles E. Marshall, Digby, Nova Scotia. Antedated March 6, 1865:

I claim, First, The combination of the shoulders, s s, the sockets, C C, and the perforated crown, as and for the purposes described.

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Second, The combination of the spurs, D D, with the straight vibrating flukes, E E, as and for the purposes specified.

50,543.—Pen Holder.—Auguste Masson and Pierre Hubert Cary, Paris, France:

We claim the handle, A, with tube, C, combined with an exterior sliding ring or tube and an inner split tube, so that the pen may be disengaged from the holder by the movement of the sliding ring or tube on the tube, C, substantially as described.

50,544.—Photography.—W. H. Smith, London, Eng.:

I claim preparing wood, glass, silk, ivory, and other substances for the reception of photographic pictures or impressions, substantially as described.

50,545.—Grain Drill.—J. H. Thomas and P. P. Mast, Springfield Ohio:

We claim, First, A seed slide, or hopper bottom, provided with rectangular holes or openings for the passage of the grain, when said openings are of such a form that by a longitudinal movement of the slide containing the openings, or of the part which covers or closes the said openings, shall be both widened and lengthened.

Second, We claim the seed slide, B, provided with the holes, D, constructed and operating substantially as set forth.

REISSUES.

2,089.—Embossed Cover of Books.—William T. Anderson and Hezekiah S. Archer, Brooklyn, N. Y., assignees of Wm. T. Anderson. Patented July 5, 1864:

We claim a book cover made by striking upa foundation of junk board or other material to form the foundation of the cover, and filling in the raised portions on the inner side, by blocks of any suitable material, substantially as and for the purpose set forth,

And we also claim combining with the board, A, struck up as described, the inner board, C, substantially as and for the purpose set forth.

2,090.—Apparatus for Collecting the Dust from Stamp Mills and Ore Crushers.—James Brodie, San Francisco, Cal. Patented May 17, 1864:

I claim the application of the wind blast through pipes or tubes into or by suction out of batteries, or other crushing machines, as exhibited and applied in the drawings for the purpose of saving the fine dust arising from said crushings.

2,091.—Rowlock.—Ira C. and F. W. Flagg, Middletown, Conn. Patented Aug. 15, 1865:

I claim constructing the horns of rowlocks with a dove tail groove, a, to receive and hold the pad, b, substantially as herein set forth.

2,092.—Spring Mattress.—Samuel P. Kittle, Brooklyn, N. Y. Patented Nov. 8, 1864:

First, I claim the combination of the two parts, A and A', and an intervening portion of the sides of the box of a box spring mattress, having the cases containing the stuffing attached to the said sides, the said parts, A A', and the intervening portion being connected to each other by hinges, the joints of which are located twice the distance apart of the thickness of the stuffing, substantially as herein above set forth.

Second, The combination of the two parts, A A', hinged at two points the distance apart of twice the thickness of the stuffing, the intervening part, A, and a series of springs, supported upon slats attached to the said intervening portion, A'', the whole being constructed and operating substantially as herein above set forth.

Third, The combination of the parts of the box containing the springs, and connected by hinges at two points the distance apart of twice the thickness of the stuffing, with the case for the stuffing gathered at the hinges or joints, as set forth.

Fourth, Providing the hinge, C, with perforations for attaching the ticking, substantially as set forth.

Fifth, The combination with the box containing the springs of braces or strengthening pieces, P or Q, at the point or points where it is cut or hinged, substantially as and to the effect set forth.

Sixth, The combination of the parts of a box spring mattress and a hinge constructed and attached to both the edge and side of the boards which form the side of the box, in the manner herein above described.

Seventh, The combination and arrangement of the catch, N, with the adjacent slats, F and F, of the box of the mattress, substantially as and for the purpose set forth.

2,093.—Bolt-heading Machines.—James Minter, Worcester, Mass., assignor to himself, Jonathan Hope and Robert H. Butcher. Patented July 12, 1864:

I claim forming the heads of bolts by the squeezing action of the heating dies, G G', G*, and G*' operating in pairs substantially as described, in connection with the upsetting die, H, substantially as set forth.

Second, The dies, G G', G* G'*, arranged in combination with each other and with their adjusting screws, substantially as specified, so as to be readily adjustable to different sizes and shapes.

Third, The spring dogs, f f' f'*, carryers, I I' I'*, with their shoulders and the dies, G G' G* G'*, in combination with the piece K, or its equivalents and the foot lever, L, when constructed and operating in the manner and for the purposes described.

Fourth, I claim the combination of the elastic plate, p, with the dog, g*, and heading die, constructed and operating as set forth.

Fifth, The lever o and cam, P, in combination with the foot levers, L, and the forming the mechanisms as described, so that said cam shall control the time of action as set forth.

Sixth, The combination of the hand lever, R, swivel arm, W, and movable jaw, q', when constructed and operating substantially as specified and for the purposes set forth.

2,094.—Cartridge Box.—Robert A. Chesebrough, New York City, assignee of J. S. Warren, Stafford, N. Y. Patented June 28, 1864:

I claim the general arrangement of the cartridge box herein described, the same consisting of an outer box or casing, in the interior of which a box divided into compartments suitable for the reception of cartridges, either loose or fixed, is hung by means of the peculiar shaped link or joint described, arranged and operating substantially as and for the purposes specified.

DESIGNS.

2,201.—School Desk.—Lorenzo Fairbanks, Philadelphia, Pa.

2,202.—Emblem of the National Union.—Horace Harris (assignor to himself and B. S. Morehouse), Newark, N. J.

2,203.—Stock of a Seal or Embossing Press.—B. B. Hill, Chicopee, Mass.

2,204.—Carpet Pattern.—Elemir J. Ney (assignor to the Lowell Manufacturing Company), Lowell, Mass.

2,205.—Paper Collar.—Albert Peck, New York City.

2,206.—Glass Bottle.—Isaac Newton Peirce, Philadelphia, Pa.

2,207.—Stove.—Jacob Steffe, Philadelphia, Pa.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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CHAS. MASON

[See Judge Holt's letter on another page.]

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

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WM. D BISHOP.

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It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

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Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft or Postal Order on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

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Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

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R. B., of Pa.—On page 280, Vol. III., we published an illustration of the apparatus then in use at Narbonne, in France, for lighting the city by means of hydrogen gas; we have not known of this gas being used for either heating or lighting purposes in this country.

S. H., of Ind.—The fallacy of Jugens's perpetual motion we suppose is apparent to every mechanic.

G. B. O., of Nova Scotia.—Starch heated to about 300° is converted into dextrin, and dextrin in presence of very minute quantities of acid, is changed to glucose or grape sugar. The starch may be heated by steam or otherwise.

A. C. L. C., of Pa.—Heating a razor by water or otherwise would certainly cause it to expand in all directions. To exterminate red ants sprinkle pulverized sugar on a sponge, and when the sponge becomes filled with the ants immerse it in boiling water.

Inquirer, of Mass.—We think your criticism of Tyndall is sound, but it would interest very few of our readers. You will probably, on reflection, come to the conclusion that precisely the same amount of mechanical force required to heat a body would be developed by the heat given off in cooling the body to its original temperature.

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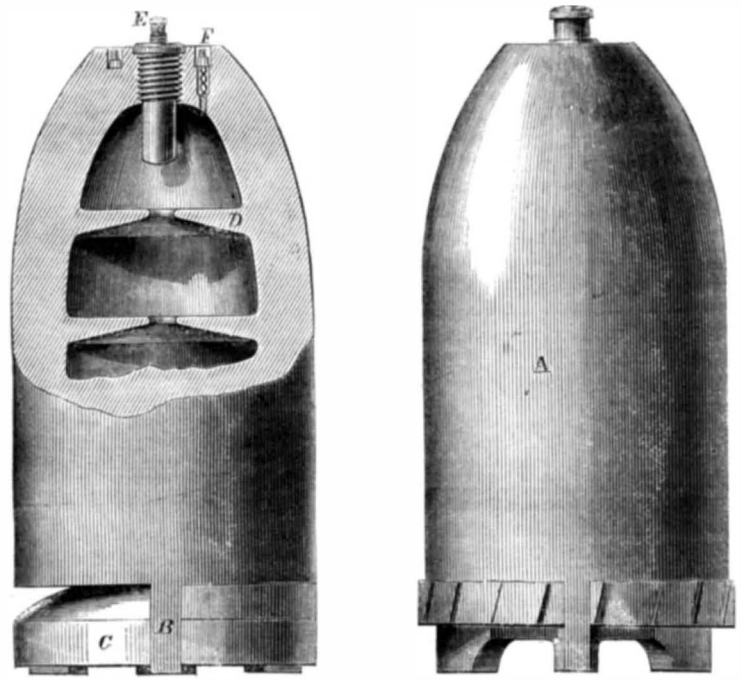

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Once upon a day, it fell out that the miller was away on furlough, to be gone all day, and the proprietor happening at the mill, found a small boy in tattered garments sitting astride a bag of corn, which lay across the back of a sorry-looking nag. The boy said his mother had no meal, and would have nothing to eat unless the corn could be ground. The proprietor said he knew nothing about running a mill, but, since the case looked like a desperate one, he would try his hand at converting a sack of corn into a sack of meal. So lifting the boy off his grist, he took the corn to the hopper, threw it in and started the mill, which rattled off in good style, eat up the corn, but returned no meal to the box. In short, the grist was totally lost.

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But the lost grist—where had it gone? The proprietor showed the miller where he put it in, and the whole mystery was solved! The grist had been put in the wheat hopper, carried up in the elevators, deposited in the bolt, through which it could not sift so as to reach the box, and there it was inside the wheat bolt, where the miller could go in and dip it out. And that is how a lawyer undertook to run a mill and lost a grist.—*Exchange.*

France has gained another peaceful industrial victory. Lately the Government of Baden invited tenders for forty-six locomotives. The English contractors offered to make them for 70,720 francs each, those of Carlsruhe for 55,720 francs, and a French establishment, from the department of the Lower Rhine, for 45,000 francs.

French Exhibition.—The Government has appointed J. C. Derby, No. 5 Spruce street, New York, agent to attend to applications for space to exhibit at the approaching French Exhibition.

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